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Instructor in Mathematics
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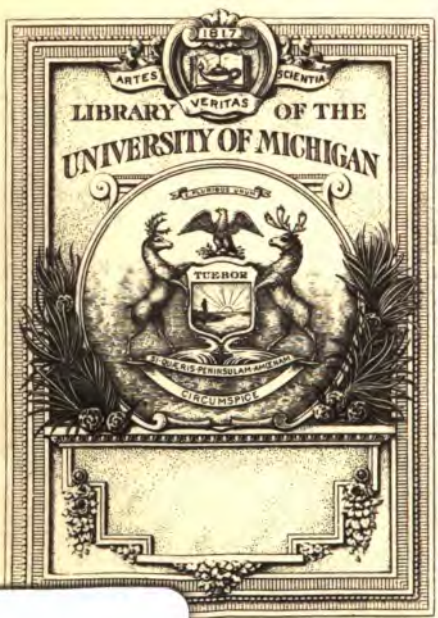

Edward H. Bott
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Miss Adams Abbotly -
from
her old teacher
Jacob Abbott.

THE

MOUNT VERNON

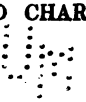
ARITHMETIC.

PART I.

ELEMENTARY.

BY

JACOB ABBOTT AND CHARLES E. ABBOTT.



"Few rules and a great deal of practice; that is the true key to the acquisition of knowledge."

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PREFACE.

It is generally the object, in text-books on Arithmetic, to give a sufficient number of problems under each rule to exemplify and illustrate the process, so that it may be fully *understood* by the pupil. But experience in teaching Arithmetic shows us that much more than this is required. It is not enough that the pupil *understands* an arithmetical process, nor that he is simply able to perform it. He must become thoroughly accustomed to the performance of it, by means of long-continued practice, until the principles involved, and the methods to be pursued, in all the various modifications which may arise, become *completely and permanently familiarized to the mind.* It is, accordingly, found necessary in the best institutions of instruction, to provide, in some way, a great number of examples for practice, after those contained in the text-books are exhausted. To aid in furnishing such a supply, is one great design of the present work.

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It has been the aim of the authors that the problems should succeed each other in such an order as to lead the pupil forward by an advance *extremely gradual* in respect to the difficulties to be encountered, so as to render necessary as few appeals to the teacher as possible for explanation and aid. One of the greatest sources of inconvenience and embarrassment to the teacher in conducting his school arises

from the personal and individual instruction and explanation which it is necessary to give to the scholars in Arithmetic. The best remedy for this difficulty is an ample supply of questions for practice, succeeding each other by such slow and regular steps of advancement, that the pupil may go on with but little external aid. The authors of this work have kept this end constantly in view, having often felt the inconvenience referred to, in their own practice as teachers. They have endeavored, therefore, to make these questions as much as possible their own expositor; so that, in using the book, the labors of the teachers may be confined almost entirely to superintending the work of the class, and encouraging the pupils in their progress.

All teachers have occasion to observe, in instructing young pupils in Arithmetical processes, that the interest which they feel in the work is very much greater when the question involves circumstances which their imaginations can picture as real incidents, out of which the question naturally arises, than when mere abstract numbers are given. In the statements of these examples, this principle has been kept in view—each one being founded on some imaginary incident, or supposed case, such as might actually arise in real life. This has been done, not only to relieve the tedium of working upon mere abstract numbers, but also to accustom the pupils to separate what is essential to the case as an Arithmetical problem, from that which is merely incidental, and which cannot affect the result.

It is earnestly recommended that the pupils using this book should transcribe the questions themselves, in a careful manner, in copy-books prepared for this purpose, entering under each, in a fair hand, the work, in full, by which they obtain the result. When it is inconvenient to provide paper and ink for this purpose, slates will answer perfectly well; but, in this case, the teacher must take special pains to inspect the work, and to interest the pupils in performing it in

a neat and workmanlike manner. The slates, in this case, should be ruled with fine lines, drawn by the point of a penknife.

This plan of transcribing the questions and the solutions, is a most effectual means of improvement for the pupil in penmanship, spelling, punctuation, and the use of language, besides rendering the exercise far more effective as a mode of acquiring Arithmetical knowledge and skill; for, in all study, we must depend more upon the review than upon the original lesson, in *fixing* knowledge, and rendering it truly our own, and the making of a fair copy of our work is the most complete and effectual review.

This method accomplishes another object, too, which will be of very great value. It provides the pupils with a large amount of very profitable employment, which will not require much attention from the teacher, except to inspect the results, and which the pupils will become very much interested in, if the teacher gives them proper encouragement, by commending the exertions which they make, and expressing his satisfaction at the rapid improvement which will soon be the manifest result.

The attention of teachers who may examine this work is especially requested to the exercises in Numeration and Notation, and to those relating to the Addition of Columns, which, it is hoped, will greatly facilitate the acquisition of skill in those operations, which often occasion such long-continued and almost fruitless labor on the part of the pupil.

The answers to the questions are inserted together at the close of the volume. It is supposed that the gradations of difficulty are so insensible in the examples given, that the pupils will take pleasure in the actual performance of the work, so as not to be under any temptation to make an improper use of the answers. Any teachers, however, who may prefer that their pupils should not have access to the

answers, can easily remove the leaves containing them from the books, before putting them into the pupils' hands.

It is highly important that every teacher should impress strongly upon the mind of his pupils the importance of going *surely* and *correctly* in every step they take in their Arithmetical operations, so as to have their work *always right*. They must understand that getting the answer right on the second trial does not atone for getting it wrong on the first; and that the true principle which is to guide them in their attempts to acquire Arithmetical skill, is to aim at *certainty* first, and rapidity afterwards.

MOUNT VERNON ARITHMETIC.

NUMERATION AND NOTATION.

FIRST PERIOD.

Notation is the art of expressing numbers in figures, and Numeration is the art of reading them when so expressed.

There are nine figures used in writing numbers; they are called the nine digits. These are the proper forms for them in writing:

1 2 3 4 5 6 7 8 9

To the Teacher.

The teachers who may use this book are requested to pay special attention to the directions which occur occasionally in the course of the lessons, addressed to them, and printed on this type.

Before commencing the lessons in Numeration, the pupils must be taught how to make the nine digits in a neat and proper manner, and to count as far as one hundred.

LESSON I.

Write all the numbers in succession from 1 to 99.

The teacher is to explain to the class while they are together how

to write the numbers as far as 20 or 30, and see that they understand how to go on. He is then to write the nine digits himself in a row upon the top of each slate, imitating the forms given above, that the pupils may observe the action of the hand in writing the figures. He is to show them also, how to rule their slates in perpendicular columns, and then direct them to write the numbers from 1 to 99 in the columns, cautioning them against the tendency to make the columns slant away to the left. No fault is to be found with the first efforts, and individual errors in writing the figures should not be sought for and pointed out, or at least only very sparingly. If it is found, on a cursory examination of the slates, that there are many errors, tell the class that they have done very well for the first attempt; and after practicing them together for a little while in writing the numbers which they were most liable to mistake, let them take the same exercise of writing from 1 to 99 the next day. When the work is presented for examination the next day, call the attention of the class to the great improvement which they will have made, and exhibit a few of the slates where the columns are most nearly perpendicular. In all cases let the pupils rule their own columns, however rude the first attempt may be. Let them understand that it is very difficult indeed to make the columns perpendicular, and that the teacher does not expect this to be done perfectly at first.

LESSON II.

Write all the numbers from 100 to 199.

Explain to the pupils that the figure expressing hundreds comes in the third place from the left; and let them see, by writing some of the numbers, in the class, that this lesson is the same as the other, except that 1 is always put in the third place, for the one hundred. And as this 1 must always come in the third place, there must be a cypher for the *second* place where there is no significant figure, viz: in all the numbers from 100 to 110. This lesson will of course be a review of the preceeding one, and the teacher will find, if the pupils feel encouraged in their work, that the faults and errors will gradually disappear of themselves, without the necessity of pointing them out one by one. If the pupils know how to write these numbers correctly already, it is of no consequence, as each lesson is still a most useful exercise for them in acquiring ease and correctness in writing columns of figures.

LESSON III.

Write all the numbers from 200 to 299.

LESSON IV.

Write all the numbers from 300 to 399

LESSON V.

Write all the numbers from 400 to 499.

LESSON VI.

Write all the numbers from 500 to 599.

The teacher should by this time begin to compare the work of the different pupils, and let them see the differences in the size of the figures, and in the degree of closeness with which they are written, and then agree with them upon some medium as a standard of uniformity for all, requesting those that had made their work too close and small, or on the other hand too coarse and open, to change their style so as to conform to the standard. And in going on through the remaining hundreds, aim at gradually bringing the class to uniformity in these respects, and at perfecting the work so that all the slates may present a distinct, neat and uniform appearance.

LESSON VII.

Write all the numbers from 600 to 699.

LESSON VIII.

Write all the numbers from 700 to 799.

LESSON IX.

Write all the numbers from 800 to 899.

LESSON X.

Write all the numbers from 900 to 999.

ADDITION.

CARRYING.

The teacher is to explain to the class that, in writing numbers, the first place on the right is the *units'* place; the second is the *tens'* place; and the third is the *hundreds'* place. These three places constitute what is called *the first period*. Then ask the following questions, the class answering generally together, but sometimes one by one, that it may be certain that every individual understands the principle involved.

QUESTIONS TO BE ASKED IN THE CLASS.

If you have added up the units' column, and it amounts to 27, how much is there to be set down in the units' place? how much to be carried to the tens'? If the amount is 28, how much for the units' place? how much for the tens'? 37? 38? 47? 48? 57? 58? 67? 68? 77? 78? 87? 88? 97? 98? 7? 8? 17? 18? 15? 14? 16? 13? 12? 11? 30? 40? 50? 60? 70? 80? 90? 1? 2? 3? 4? 5? 6? 7? 8? 9? 10? 11? 12? 13? 14? 15? 16? 17? 18? 19? 20? 21? 22? 23? 24?

The above questions, and others of a similar character, should be practiced until all the class are perfectly familiar with the answers in every case.

If you have added a column of tens, and the amount is 37, how much is there to be set down in the tens' place? How much to be carried to the hundreds'? 38? 47? 48? 57? 58? 67? 68? 77? 78?

A certain number of the following examples should be assigned in class-meeting, as the lesson. They should be read, and explained, so far as to make it certain that all the class understand exactly how they are to be performed; the class are then to be desired to transcribe the questions successively on their slates, in a neat and fair hand, with the work pertaining to each underneath it, the several numbers having words of explanation annexed in the manner shown below. At the outset the pupils should be taught to set down the numbers that are to be carried, in a line left for this purpose immediately under the column, as is exemplified in the examples given below. Their having these numbers thus preserved, will be the proof that they have actually performed the work assigned. At the next class-meeting, the work should be brought in and inspected by the teacher; the good efforts should be commended, whatever may be the degree of success; faults and mistakes should be corrected quietly, without calling particular attention to them; and then, if convenient, the class should be provided with neat copy-books, to transcribe the questions and the work into, at their seats. These books are to be exhibited at the next class-meeting, and then a new lesson may be assigned, to be performed first on the slates, as before. In transcribing the examples into the books, the line of numbers to be carried may be omitted, or not, at the discretion of the teacher.

EXAMPLES.

1. A gentleman once took his son and daughter out in a boat upon a pond. He gave 20 cents for the use of the boat, 29 cents to a man to row them, and 45 for some cakes. What did all cost?

WORK UPON THE SLATE.

(1.)

For the boat,	20 cts.
The man,	29 "
Refreshments,	45 "
Amount carried,	1
Total,	94 cts.

2. A girl once had a portable writing-desk sent her as a present. It was unfurnished. She bought two sticks of sealing-wax and some wafers for 18 cents, an ink-stand and sand-box for 25 cents each, two quires of letter paper for 37 cents, and a handsome paper-folder for 50 cents. How much did all cost her?

(2.)

Sealing wax and wafers,	*18* cts.
Ink-stand,	*25* "
Sand-box,	*25* "
Letter paper,	*37* "
Paper folder,	*50* "
Amount carried,	*2* "
Total,	*1,55*

3. The desk itself had cost $7,50, and her father gave her a knife, which cost 87 cts. What then did the desk and all its contents cost?

Explain to the class the meaning of the character $, and also, that any number of dollars may be written as if it were so many hundred cents.

(3.)

Desk,	*7,50*
Knife,	*87*
Her expenditures as above,	*1,55*
Amount carried,	*11*
Total,	*9,92*

4. A boy had a squirrel, and a cage to keep him in, which was hung up in the garden. The squirrel cost 37 cents, the cage 56 cents, and the boy bought 17 cents worth of corn to feed him with. After some time, he exchanged his cage for a larger one, which cost 75 cents, the boy paying the difference, which was 37 cents. How much did he expend for his squirrel in all?

5. His uncle, who kept a store, sold him a bowl to put some water in for his squirrel, when he kept him shut up in his cage. The price of the bowl was 6 cents. The squirrel at last grew very tame, so that he would run up the boy's arm, and play with him in various ways; and finally the boy bought a little wagon for 63 cents, in hopes that he might teach him to draw it, but he did not succeed. What was the whole amount which he had now expended?

6. There is a house which consists of four stories and an attic. The first story is twelve feet high; the

second, eleven; the third, nine; and the fourth, eight. The attic, measuring to the highest part of the roof, is thirteen feet. The chimneys rise eight feet above the highest part of the roof. How far is it from the ground to the tops of the chimneys?

7. In a certain steamboat the officers and crew, including the engineers and firemen, amounted to seventeen. There were forty-nine adult passengers, and thirteen children. There were four horses in the forecastle, and two carriages. There were also three dogs, and two canary birds, belonging to passengers. How many living things were there on board?

Explain the meaning of the words *adult* and *forecastle* to the class.

8. Two engine companies once met upon a bridge. One company contained 37 members, and the other 28. While they were there, a hose company came up containing 18 members. How many men were there in all upon the bridge?

9. A gentleman was calculating what it would cost him to take his children out to ride. The carriage would be 2 dollars and 50 cents. There would be a toll of 17 cents to pay in going, and another of 13 cents, on another road, in returning. What should the gentleman have calculated that the whole expense of the ride would be?

10. The party mentioned in the last case met with an accident: they broke a part of the harness, which it cost 37 cents to repair. Besides this they stopped at an inn and took tea in a little back parlor, which cost

113 cents. How much did the expedition actually cost?

11. Four schools went to a museum together, to see some fancy glass-blowing. The first school contained 35 scholars, the second 28, the third 9, and the fourth 78. There were 12 other spectators beside. How many were there in all?

12. Add together the number of hours in a day, days in a week, weeks in a month, and months in a year.

13. Ascertain, by addition, how many days there are in four years, on the supposition that there are three hundred and sixty-five days in one year.

14. Ascertain, by addition, how many hours there are in a week, there being twenty-four hours in each day.

15. There being 168 hours in a week, ascertain, by addition, how many there will be in six weeks.

16. Several men wanted to raise the sum of 10,000 dollars to build a bridge. One man said he could furnish 3280 dollars, another 1262, another 359, another 720, and another 1954. How much had they in all?

17. A boy had a store of walnuts, chesnuts, and filberts. He said he thought he had as many in all, as there were days of the year. He found, on counting them, that he had 194 walnuts, 68 chesnuts, and 102 filberts. How many had he in all?

18. A gentleman was traveling with his son and daughter. The first day they rode 40 miles on the rail-

road; the second day they sailed 20 miles in a steamboat; the third day they traveled 15 miles in a stage coach. How long was their journey?

19. A lady one day gave her two sons, Charles and Robert, some money to expend as they wished. They went out together and bought some marbles for 10 cents, and some apples and cakes for 12 cents. Now, said Robert, we have but 25 cents left; and as mother was so kind as to give us this money, let us expend the rest in a present for her. So they bought her a little work-basket. How much money did they expend?

20. Six girls received a certain amount of money each week as an allowance for pocket money. The first received 6 cents, the second 12, the third 18, the fourth 25, the fifth 37, and the sixth 50. One week they put all their money together to buy a little library. How much did it amount to?

21. A ship went to sea. The first day she sailed 40 miles, the second 60, the third 80, the fourth day 120, and the fifth day only 30. How many miles did she sail in all?

22. In a certain garrison there are 12 officers, 300 soldiers, and a band of musicians, consisting of 30 members. How many are there belonging to the garrison?

23. In another garrison there are 6 officers, 150 soldiers, and a band consisting of 20 members. How many belong to this garrison? and how many belong to both garrisons? How many *soldiers* belong to both garrisons?

24. The pupils connected with a certain school are arranged in four different rooms. The first room contains 30 scholars, the second 70, the third 100, and the fourth 120. How many pupils are there in the whole school?

25. Suppose a man, in furnishing a house, should expend $100 for carpeting, $70 for crockery, $40 for hardware, and $250 for other articles of furniture. What would it all amount to?

It should be explained to the pupil that the annexing of a point with two cyphers to the dollars, causes the amount to become cents; but the value is not altered.

26. Suppose a farmer raises 70 bushels of buckwheat, 160 of rye, 230 of wheat, and 150 of corn. How many bushels of grain will he have in all?

27. Five men are employed to work by the job. The first receives $28; the second $45; the third $64; the fourth $62; and the fifth $70. How much do they all receive?

28. A boy asked his father if he might purchase a gray squirrel. His father asked him to calculate what it would cost, provided he should pay fifty cents for the squirrel, seventy-five cents for a cage to put him in, and forty-five cents for corn for him to eat. What should have been the boy's answer?

29. A gentleman bought for his son a little dog, for which he paid one dollar; he also paid a carpenter one dollar and ninety-five cents for making for him a little kennel. How much did it cost the gentleman?

30. The boy paid forty-two cents for a brass collar, and twelve cents for having his name engraved upon it. How much did it cost the boy?

31. How much did it cost the gentleman and the boy both?

32. Another boy thought he should prefer some rabbits to a dog. Accordingly he paid thirty-two cents for a pair of young rabbits; one dollar and seventy-eight cents to a man for making a rabbit warren; ten cents for clover seed, which he intended to sow in the yard, that the rabbits might eat of its leaves when grown; and six cents for straw for them to lie upon. How much did all cost the boy?

33. If a boy pay twenty-five cents for two hens, fifty cents for a pair of ducks, twenty cents for corn for them to eat, and one dollar and sixty-two cents for a house for them, how much will all cost him?

34. If a boy pay to a carpenter forty-three cents for a white-oak sled, and to a blacksmith seventy cents for putting on iron shoes, and seventeen cents for a rope to draw it with, how much will all cost him?

35. A boy once paid two dollars and eighty-four cents for an old gun, one dollar and eighteen cents for having it repaired, and twenty cents for powder and shot. How much did he pay for all?

36. If a boy were to pay eighteen cents for a kite frame, two cents for a newspaper, twelve cents for pasting the paper on the kite, and seventeen cents for twine, how much would he pay for all?

37. One day a boy asked his father for money to buy school books. His father asked him how much he needed? The boy replied, for a geography I need one dollar and twelve cents, for an arithmetic fifty-six cents, for a reader thirty-one cents, and for a slate fifteen. How much did he need in all?

38. How much would he need to buy all except the geography and the slate?

39. A gentleman told his son that he would take him on a short journey to be gone one night, if he would tell him how much the expenses would be. He said he should have to pay seventy-five cents for supper for both, fifty cents for lodging, sixty-two cents for breakfast on the following morning, and thirty-seven cents for taking care of the horse. What should have been the boy's answer?

40. A boy said to his father that the school which he attended was divided into three departments, the Infant School, the Primary Department, and the Senior Department; that the Infant School contained fifteen pupils, the Primary Department thirty-eight, and the Senior Department sixty pupils. How many pupils were there in the whole school?

41. In a certain town in the country there are five district schools. In the first there are ninety pupils; in the second, one hundred and two; in the third, eighty-four; in the fourth, ninety-eight; and in the fifth, one hundred and twenty. How many pupils are there in all?

42. In the first school there are forty boys; in the second, sixty; in the third, fifty-three; in the fourth,

forty-eight; and in the fifth, seventy. How many boys are there in all the schools?

43. In the first school there are fifty girls; in the second, forty-two; in the third, thirty-one; in the fourth, fifty; and in the fifth, fifty. How many girls are there in all the schools?

44. Three ships go to sea. One carries out a crew of ten men; one a crew of fourteen men; and the other a crew of sixteen men. How many men are there in the crews of all the ships?

45. At a great fire in a large city there were burnt on one street 33 houses, on another 47, on a third 54, on the fourth 28, on the fifth 96, and on the sixth 120. How many were burnt on all the streets?

46. Besides this, 14 houses were pulled down, to stop the progress of the fire. How many were destroyed in all?

47. A man owned a sleigh worth $50, a carriage worth $75, and two horses worth $70 each. What was the value of the whole?

48. The sleigh was sold for $42, the carriage for $15, and each of the horses for $64. How much did they all sell for?

49. A merchant bought 7 firkins of butter. The first contained 27 pounds, the second 46, the third 59, the fourth 63, the fifth 38, and the remaining two 77 pounds each. How many pounds of butter did he buy?

50. A girl named Mary went into a toy-shop, and

asked the price of a work-box. The shopman said it was two dollars and twenty-five cents. There were places in it for a thimble and a pair of scissors. The thimble cost twenty cents, and the scissors fifty-seven. What would the whole cost?

51. How much would it cost if Mary had added two papers of needles at six cents each?

52. A boy came down to a river to cross a ferry. He was riding with his father and mother, in a one-horse chaise. After they had entered the ferry-boat, there came a stage-coach with 9 passengers, and drove into the boat. The coach had 4 horses. Next came 4 boys; one of them had a basket, containing a hen and 11 chickens. All of these got into the ferry-boat and began to cross the river. There were 2 ferry-men to set the boat across. Just as they started there came down a hay-cart drawn by 4 horses, with 7 men in it, who were returning from their day's work; but there was not room for them.

1. How many *persons* were there in the boat when she crossed?

2. How many *living beings*, including the men and boys, and the animals?

3. For the stage-coach and its passengers the charge at the ferry was 29 cts., for a one-horse chaise 11 cts., and one cent each for boys. How much money did the ferry-man receive?

4. He had $2,35 in his pocket before. He counted up all his money when he got home. How much did he find?

5. How many passengers in the ferry-boat would

there have been if there had been room for the hay-cart? How many living beings?

53. A man took a journey. The first day he traveled by stage 40 miles; the second day by steamboat 150 miles; then he traveled 3 days by railroad, 250 miles each day. How many miles did he travel in all? How many days did he travel?

54. James and John lived near a bridge which led across a river. In winter there was usually a road across the river on the ice also. One day James said to John, let us observe for half an hour, and see whether more cross by the bridge, or by the ice. I say the bridge, said John. I say the ice, said James. First came a gentleman and lady with a child in a sleigh; which, with the horse, made 4. They crossed by the bridge. Next came a farmer and his boy driving a four-horse team. They crossed by the ice. Next came a drove of cattle, 29 in all. They tried to drive them over the bridge, but 5 of them got away and went over on the ice, leaving 24 to go over on the bridge. Next came 7 boys who were going a-fishing. They crossed on the ice. Finally there came a flock of sheep. They counted them, and made 37. They too crossed on the ice. How many crossed on the bridge? How many on the ice?

55. The next day there was a thaw, which weakened the ice, and the boys thought they would make their observation again. First came a man with a load of hay, drawn by 4 oxen. There was a boy upon the top of the load. This party went over by the bridge. Next came 2 loads of wood, each drawn by 1 yoke of

oxen. There was one man for each. They went over on the bridge. Next came a drove of cattle; there were 67 in it. It was driven by 3 men on horseback, and went over on the ice. Finally there came a flock of sheep, containing 70, driven by a man and 3 boys. The man was on horseback. They went over on the ice. How many men and animals crossed on the ice? How many by the bridge?

56. A boy had a canary bird. He gave 50 cts. for him. His uncle gave him a cheap wire cage to keep him in, which cost 83 cts. He bought 75 cts. worth of seed for him, and he paid a painter 15 cts. for painting the top of the cage. The boy also gave 10 cts. for mending one of the wires of the cage. At the end of a month the bird died. How much had the boy spent for his bird? How much had the boy and his uncle spent?

57. A gentleman purchased a fine branch of coral, for which he paid 75 cts. He thought he would have it set in a pedestal of plaster of Paris. The plaster cost 10 cts., and the man who set it charged 40 cts. How much did it all come to?

58. A little girl was once promised a bird, upon condition that she would tell how much the expenses of it would be. The bird was to cost $12,00, the cage $5,00, the seed $7,00, and the trouble of keeping it $10,00. How many dollars in all would the bird, cage, seed and board amount to?

59. A mother once sent her little daughter out to purchase some articles. She told her to buy half a

yard of muslin, which would cost 6 cents; 12 spools of cotton, which would cost 72 cents; 3 papers of needles, which would cost 37 cents; and 6 yards of calico, which would cost $3,00. How much did she expend for all the articles?

60. A boy had some money given to him on Christmas. He expended it as follows: 25 cents for marbles, and 12 cents for cakes; he gave 30 cents to a poor man, and 60 cents he lost. How much had he in all?

61. Charles and Mary had 2 apples, 4 oranges, 28 pears, 37 figs, and 72 plums, which they divided equally among themselves. How many did they have in all?

62. In going to school I passed 27 boys, 33 girls, 62 women and 9 men. How many persons did I pass?

63. Eliza had given to her on her birthday the following sums of money: $1,75, $1,87, $2,00, and $4,37. How much money did she receive?

64. In one book there are 165 pages, in another 432. How many do both contain?

65. In a garden there are sixteen roses, twenty-eight violets, thirty-nine lilies, and thirty-seven pinks. How many flowers does the garden contain?

66. In a drawer at school there are 7 sharp pencils and 9 dull ones, 28 pens, and 13 lead pencils. How many things are there in the drawer?

67. There are three pieces of cloth: one contains 57 yards, one 63, and the other 96 yards. How many yards are there in the three pieces?

68. On the first page of a book there are 294 letters; on the 2d, 137; and on the 3rd and 4th, 274 each. How many letters are there on the four pages?

69. A farmer raised in one year various kinds of grain, in quantity as follows: of wheat, 100 bushels; of rye, 75; of barley, 63; of buckwheat, 42; and of corn, 140. How many bushels of grain did he raise in all?

70. Some gentlemen formed a party of pleasure, to make an excursion in a steamboat. When they got on board, they found that there were 25 gentlemen, 30 ladies, and 12 children. How many were there in the party?

71. William, Henry and John went out one morning to fish. William caught 5 fish, Henry 10, and John 6. How many did all catch?

72. Ellen had given her by her father and mother, at different times, various sums of money, as rewards. She appropriated the money in this way: She gave $4 for a canary bird, $2 for a cage, and then had left in her possession $3. How much had she at first?

73. Mary gathered some dahlias for the flower-vases, and carried them to her mother, who put 9 into one vase, and 7 into another, for the front-parlor mantel-piece: she put 8 into another, and 10 into another, for the back-parlor mantel-piece. How many dahlias were there in all?

74. A lady expended for her little daughter two dollars for a wax doll, half a dollar for a bonnet, half a dollar for a cradle, and one dollar for a chest of

drawers, intending to give them to her at Christmas. How much did she expend for the whole?

75. A market-man sold 10 pounds of cheese to one man, 7 pounds of butter to another, and 6 pounds of meat to another. How many pounds did he sell in all?

76. A gentleman paid board for himself, son and servant, for a month. For himself, $20,00; for his son, $18,00; and for his servant, $10,00. How much did he pay for all?

77. On a Thanksgiving-day, a little boy had some money given him, to be spent in whatever way he pleased. He bought 8 cents' worth of marbles, 5 cents' worth of cakes, and 10 cents' worth of apples. He also gave 6 cents for an orange, and, meeting a poor old beggar man, he gave him 25 cents. How much was the whole amount?

78. A man drove some geese to market, which he divided into three divisions. The first contained 80, the second 60, and the last 100. How many were there in all?

79. There was a lady who bought some toys for her daughter. For a doll she paid $1,00; for a work-box, $2,00; for a little table, $4,00; and for a set of tea-things, $5,00. How much did she expend?

80. For her boy, she bought a handsome rocking-horse for $10,00; a whip for $1,00; a little gun for $2,00; and a pair of skates for $1,00. How much did she spend for her boy, and how much for both?

81. A ship sailed on one voyage of ninety days, on

another voyage of sixty days, and on a third of two hundred and sixty days. How many days were consumed in all the voyages?

82. Four boys had each a little garden. The first raised twenty-four water-melons; the second, eighteen; the third, twenty; and the fourth, twelve. How many did they all raise?

83. They all sold their melons. The first received for his, one dollar and forty cents; the second, one dollar and five cents; the third, one dollar and ten cents; and the fourth, seventy cents. How much did all receive for their melons?

84. Three boys went into the woods for berries. One gathered sixteen quarts, one twenty-three quarts, and one thirty-one quarts. How many quarts did all gather?

85. The first boy sold his berries, and received for them sixty-four cents; the second boy received seventy-two cents; and the third boy received one dollar and twenty-four cents for his berries. How much did all receive?

86. A lady went to buy some books for her three daughters. For Jane, she bought a book that cost twenty-nine cents; for Lucy, one that cost sixty cents; and for Julia, one that cost forty-five cents. How much did all the books cost?

87. On another occasion, the lady went out and bought two yards of flannel for sixty-two cents, some spools of cotton for twelve cents, some tape for ten cents,

a yard of silk for one dollar and twenty-five cents, and a paper of pins for ten cents. How much did she pay away for her purchase the second time she went out?

88. Four girls attended the Sabbath School, and in the course of the year the first read fifteen of the books in the library; the second read twenty-five; the third, nineteen; and the fourth, thirty. How many did all read during the year?

89. A lady went out one cold winter's day, to visit some poor people. To a little girl she gave a bonnet that cost $1,50; to an old man, a coat that cost $2,00; and to a blind old lady, $3,00 for wood. How much did she pay away?

90. If a man can earn $2,00 per day, his wife $1,00, his daughter 50 cents, and his son 75 cents, how much can all earn during the day? If he should pay $30,00 for house-rent, $15,00 for provisions, $70,00 for clothing, and $15,00 for the doctor's bill, what would be his expenses for the year?

91. A gentleman took a ride, and the expenses of it were as follows: for the use of the carriage he paid $5,00; for crossing a ferry, 12 cents; for crossing a bridge, 15 cents; and for a little refreshment for his party, 62 cents; also, for damage done to the horse, by over-driving him, he paid $15,00. What was the whole expense of the ride?

92. If a gentleman should pay $80,00 for a horse, $180 for a chaise, and $25,00 for harness, what would his whole riding establishment cost?

93. A farmer went out into his barn-yard one winter morning, to feed his cattle. He had three oxen and three cows. He wished to make a calculation of what

would be the probable weight of the beef. He estimated that one ox would weigh 880 pounds, another 800, and the third 860. If his estimates were correct, what would be the total weight of the oxen?

94. One of the cows he thought would weigh 500, another 550, and another 600. What would be the total weight of the cows?

95. What would be the weight of all the cattle?

96. He calculated that the beef would be worth 250 dollars, and the hides 19 dollars. What would be the whole value?

97. The cost of getting the cattle to market would be five dollars for men to drive them, and seven dollars for expenses by the way. What would be the whole cost?

98. A boy had four scrap-books. He counted the pictures in each book. In the first were 120, in the second 210, in the third 190, and in the fourth 71. How many pictures had he in all?

99. Some children collected all their books, and arranged them on the shelves of a little library. On the first shelf there were 150 small books, on the second 94, on the third 75, and on the fourth 81. How many books were there in all?

100. Three boys went on a fishing excursion out into the middle of a deep pond. James had a fishing line 29 feet long, John had one 19 feet long, and Samuel's line was 23 feet long. When they had got out into the middle of the pond, they tied all their lines together, and let a small stone down by means of them, to see whether they could reach the bottom of the pond. The pond was 75 feet deep. Did they reach the bottom?

101. A boy borrowed four books of his cousin. The first contained 280 pages, the second 220, the third 140, and the fourth 192. How many pages were there in all?

102. There was once a church having a tower with a spire upon the top. There was a ball upon the top of the spire, and a cross above the ball—a lightning-rod extended 6 feet above the ball. The tower was 70 feet high. The spire rose 40 feet above the top of the tower. The ball was 5 feet in diameter. How high was it from the ground to the points of the lightning-rod?

103. If a gentleman should buy a bass-viol for one son for $14,00, a flute for another for $25,00, two music books for $1,75, and should also pay a music teacher $12,00 for instructing them in the use of the instruments, what would be the whole expense?

104. If there are five churches in a town, and the first will contain 300 people, the second 350, the third 580, the fourth 600, and the fifth 460, how many people can go to church upon the Sabbath in that town?

105. A gentleman took his son to a clothing store to be fitted for the winter. He said, I want a pair of pantaloons at $4,00, a vest at $2,00, a coat at $9,00, and an over-coat at $20,00. What did the whole cost?

106. If a gentleman purchase a house for $500, land for $425, and furniture for $250, how much money will he pay for all?

107. If a boy buy 12 marbles for 12 cents, 6 apples for 18 cents, and a book for 50 cents, how much money must he have to purchase them with?

108. Two ladies going a-shopping purchase 13 yards of calico for $3,25, 3 yards of ribbon for $1,25, a pair of gloves at 62 cents, and 2 yards of velvet for $5,00. How much did the shop-keeper receive from the ladies?

109. Four little boys were playing at marbles; one had 20, another 40, another 16, and the other 8. One said his cost 37 cents, another 75 cents, another 25 cents, and the other boy said his cost 12. How many

marbles did they all have; and how much did they all cost?

110. Julia and Mary went out to gather apples. Mary gathered 15 apples, and Julia 18. How many did they both get?

111. A farmer had 20 peach-trees, 24 plum-trees, 22 pear-trees, and 50 apple-trees. When he gathered his fruit he found he had 22 bushels of peaches, 18 bushels of plums, 80 of pears, and 400 of apples. How many trees had he in his orchard; and how many bushels of fruit?

112. There was a family composed of 9 individuals. The grandfather's age was 80, the father's 58, the mother's 55, the oldest son's (whose name was Edward) 30, Mary's 25, Benjamin's 22, Martin's 18, Catharine's 15, and John's 13. How many years would their united ages amount to?

113. There is a very large school, in a city, in which there are six rooms for the scholars. In one room, for juvenile scholars, there are 70; in the next room, 40; in the next, 45; in the next, 50; in the next, 60; and in the largest room, 100. How many scholars are there in the school?

114. Four little girls went to the woods to take a walk, and while they were there they came to an oak tree. It looked so pleasant and shady beneath that tree that they stopped to play a little while, and they amused themselves in gathering the acorns that had fallen. One gathered 20, another 35, and another 15;

but the fourth, who was a small girl, met with less success, and could only find 6. How many did they all gather?

115. One rainy day, in New York, a poor boy stood at a corner of the street to sweep the crossing. To every man that crossed he held out his hat, hoping to receive at least a penny. The first ten that passed took no notice of him. The next man gave him two cents. After that six passed without giving him anything. Then a man gave him six cents. Four persons passed and gave him nothing. Then came a lady from whom he hoped to receive much. The boy held his hat to her. She gave him six cents. Then fifteen crossed and gave him nothing. But just after them an old gentleman, who had crossed several times before without paying anything, passed again and gave him a ten cent piece. How many persons passed? How much did the boy receive?

116. The next day was warm and dry, and the boy was obliged to resort to other means of earning money. He first went on an errand for a gentleman, who gave him ten cents. He then shoveled a load of coal down through a hole in the pavement, to the space below, for which he received twelve cents. A short time after that he held a gentleman's horse, while the owner went into a bank on business, for which he received six cents. Afterwards he saw a lady drop her purse, and ran and picked it up and gave it to her. She rewarded him with ten cents. How much did he receive on that day?

117. The next day he thought he would try his for-

tune in selling fruit. He went to market and bought a dozen oranges for 14 cents, two dozen apples for 10 cents, a quantity of cake for 36 cents, some candy for 42 cents, and a basket to carry them in for $1,25. In selling these articles he received 20 cents for the oranges, 24 for the apples, 50 for the cake, and 30 for about half the candy; the residue he was not able to sell. How much did he pay for all the articles? How much did he receive?

118. The next day he carried books about for sale, and in the course of the forenoon he sold ten books; for the first of which he received 15 cents, for the second 40, for the third 34, for the fourth 62, for the fifth 76, for the sixth 81, and for the other four, in which there were pictures, 18. How much did he receive for all?

119. If a stage-driver receive from his passengers $13,00 on Monday, $15,25 on Tuesday, $12,30 on Wednesday, $12,89 on Thursday, $17,00 on Friday, $14,00 on Saturday, how much will he take during the week?

120. A gentleman told his son that he would allow him 3 cents per week for brushing his shoes, 2 cents for bringing wood up into his study, 25 cents for going to the post-office, 6 cents for going to the pasture for his cow, and 20 cents for doing other errands for the family. How much did the boy earn per week?

121. On a New Year's day a boy bought a book for 12 cents, a sled for 62 cents, a pair of skates for 75 cents, a quart of walnuts for 8 cents, and a dozen oranges for 15 cents. How much did he spend?

122. On a certain day a little boy read 6 pages, containing 1725 words, and his sister 4 pages, containing 1380 words. How many pages did *each* read? How many did *both* read? How many words did each read? How many did both read?

123. During the week a boy wrote six copies in his writing book. On the first page were 96 words, on the second 108, on the third 112, on the fourth 89, on the fifth 87, and on the sixth 102. How many words did he write in all the pages?

124. Another boy writing, wished to know the number of letters he had made; and after a careful examination, found that there were on the first page, 480 letters, on the second, 450, on the third, 448, on the fourth, 445, and on the fifth, 493. How many letters did he make?

125. A teacher wished to know how many sums had been done by his class in Arithmetic, during the last six weeks; and on inquiry found that during the first week they had done 72, during the second week 69, the third 96, the fourth 98, the fifth 102, and the sixth 89. How many sums did they perform during the six weeks?

126. Three boats started from New York for Albany the same afternoon. The first carried 500 passengers, the second 729, and the third 1,257. How many did all the boats carry? The first boat received as passage money, $700; the second boat $984; and the third boat $1,572. How much did all receive?

NUMERATION AND NOTATION.

SECOND PERIOD.

LESSON I.

Write all the numbers from 1,000 *to* 1,100.

Explain to the pupils that the exercise is the same as writing from 1 to 100, except that the figure 1 is to be prefixed with a comma after it, denoting that it is the last figure of the second period. Let them observe that the comma comes, in the writing, where the word *thousand* comes in the reading of the numbers, just as if the comma were pronounced *thousand*. Particular attention must be paid to the perpendicularity of the columns, and the equidistance and symmetry of the figures.

LESSON II.

Write all the numbers in the following series:

One thousand and one,	1,001
Two thousand and two,	2,002
Three thousand and three,	3,003
And so on, up to—	
One hundred thousand and one hundred,	100,100

LESSON III.

Write all the numbers in the following series:

One hundred thousand and one hundred.

One hundred and one thousand, one hundred and one.

One hundred and two thousand, one hundred and two.

And so on to—

One hundred and ninety-nine thousand, one hundred and ninety-nine.

Explain to the pupils that the second period is to be written just like the first, with the comma between, corresponding to the word thousand. Do not teach them to enumerate from the right hand, units, tens, hundreds, &c., as this is an unnecessary trouble; but if they have, for example, one hundred and twenty-five thousand, one hundred and twenty-five, they have only to write 125 for the thousands, and 125 for the rest. A little practice in the class will make this plain to them.

LESSON IV.

Write all the numbers of this series :

Two hundred thousand and two hundred.

Two hundred and one thousand, two hundred and one.

Two hundred and two thousand, two hundred and two.

And so on to—

Two hundred and ninety-nine thousand, two hundred and ninety-nine.

LESSON V.

Write all the numbers in this series:

Three hundred thousand and three hundred.

Three hundred and one thousand, three hundred and one.

Three hundred and two thousand, three hundred and two.

And so on to—

Three hundred and ninety-nine thousand, three hundred and ninety-nine.

LESSON VI.

Write all the numbers in this series :

Four hundred thousand and four hundred.

Four hundred and one thousand, four hundred and one.

Four hundred and two thousand, four hundred and two.

And so on to—

Four hundred and ninety-nine thousand, four hundred and ninety-nine.

LESSON VII.

Write all the numbers of this series:

Five hundred thousand, and five hundred.

Five hundred and ten thousand, five hundred and ten.

Five hundred and twenty thousand, five hundred and twenty.

And so on to—

Nine hundred and ninety thousand, nine hundred and ninety.

LESSON VIII.

Write all the numbers of this series:

One hundred thousand and one.

One hundred thousand and two.

One hundred thousand and three.

And so on to—

One hundred thousand and ninety-nine.

LESSON IX.

Write all the numbers of this series:

Two hundred thousand, and one hundred.

Two hundred thousand, one hundred and one.

Two hundred thousand, one hundred and two.

And so on to—

Two hundred thousand, one hundred and ninety-nine.

LESSON X.

Write all the numbers of this series:

One hundred and fifty thousand, one hundred and fifty.

One hundred and fifty-one thousand, one hundred and forty-nine.

And so on to—

One hundred and ninety-nine thousand, one hundred and one.

ADDITION OF COLUMNS.

The art of adding columns of figures with readiness and certainty requires practice, but it must be right practice, or it will be of no avail. Many persons continue through life, adding columns of figures frequently, as occasion requires, without any sensible improvement in the facility with which it is done. They practice, but their practice is wrong. Their labor does not advance them, for they are not upon the right track.

The essential thing is, that in all cases, from the very outset, the pupil should add each number which the several figures represent as *a whole*, instead of adding the successive units of which it is composed, one by one. This latter is a very common practice; but no great degree of facility in adding columns can possibly be acquired while it is continued. It is obvious that this successive enumeration of the units, whether it is done by naming them aloud, or running over them rapidly in the mind, or counting them by the fingers, must cause great delay. Some pupils do acquire great dexterity in thus counting up with their fingers. If they have to add 27 and 9, for example, they say mentally 27,—28, 29, 30,—31, 32, 33,—34, 35, 36, with great rapidity; and they arrive at last at the result, 36. But it is obvious that no attainable degree of nimbleness in running over all those intermediate steps will ever equal in rapidity the saying at once 27 and 9 are 36.

Some persons have an idea that pupils must count up in this way, for a while, and that they will at length come to learn what the result is, in all the possible combinations of numbers, and so omit the intermediate steps. 'But our experience and observation do not confirm

this idea. Persons go on through life on this counting plan, without learning to take the leaps which are essential to all rapid adding. Just as the mass of mankind go on through life saying, "Thirty days hath September," &c., and after half a century of such practice, have to repeat the whole stanza till they come to the month they want, before they can tell how many days it has. How much better it would have been to have learned the number of days of each month, independently, at the outset; and then the proper number would have come up readily to the mind, in connection with the name of each month, just as the number of days in a week, or months in a year, suggests itself instantaneously to the mind the moment that the question is asked. In the same manner, in order to learn to add by leaps, taking in each number as a whole, it is best to *begin* in that way; and never to allow one's self to count or enumerate the successive units at all. It is very difficult to contrive exercises for young pupils which will secure this end, but those which follow are designed with this view; and this explanation will aid both teachers and pupils in carrying out the intention.

Let the pupils read in the class, simultaneously, the following columns, beginning at the bottom of the units column, and adding as they proceed—thus, 5, 10, 15, 20, &c.; and after adding the units column in this manner, let them say, "Write down cypher," and then at the foot of the tens column, begin naming what is to be carried first—thus, 5, 10, &c. Where a cypher occurs no notice is to be taken of it, but the pupil passes on to the next significant figure above.

The pupils should add the columns aloud in this manner, one by one, each pupil taking a column. Then all should add together, speaking simultaneously, the teacher regulating the time. If they all come out exactly alike at the tops of the columns, it will show that they really run up the column from figure to figure with the eye and perform the additions.

If there is a black-board in the class-rooms, the practice may be very profitably varied by transcribing a sum upon it, and thus letting the class answer simultaneously, while the teacher points to the successive figures, the class naming the increasing amounts as he ascends the column.

It is specially important that in all cases no useless words should be used. Thus the pupil should not say, five and five are ten and five are fifteen, &c., but simply, five, ten, fifteen, &c.

The object of the first few examples is mainly to accustom the class to the method, and prepare them to go on correctly with those which follow, which comprise combinations with which they are less familiar.

QUESTIONS TO BE ASKED IN THE CLASS.

How much are 5 and 5? 15 and 5? 20 and 5? 35 and 5? 40 and 5? 65 and 5? 30 and 5? 90 and 5? 75 and 5? 10 and 5?

How much are 9 and 1? 19 and 1? 29 and 1? 39 and 1? 49 and 1? 59 and 1? 69 and 1? 61 and 9? 51 and 9? 41 and 9? 31 and 9? 21 and 9? 11 and 9? 1 and 9?

How much are 8 and 2? 18 and 2? 28 and 2? 38 and 2? 48 and 2? 58 and 2? 68 and 2? 62 and 8? 52 and 8? 42 and 8? 32 and 8? 22 and 8? 12 and 8? 2 and 8?

EXAMPLES FOR PRACTICE.

FIRST SERIES.

1.	2.	3.	4.
89,215	89,585	88,912	11,221
21,895	21,525	28,998	89,899
89,215	99,885	92,112	21,215
21,895	11,225	19,988	29,885
89,215	82,995	91,121	81,225
21,895	28,115	11,829	88,285
81,215	98,895	89,281	22,825
29,895	12,215	28,899	98,285
55,555	00,555	02,215	12,825
00,005	55,005	55,555	55,555

How much are 7 and 3? 17 and 3? 27 and 3? 37 and 3? 47 and 3? 57 and 3? 67 and 3? 63 and 7? 53 and 7? 43 and 7? 33 and 7? 23 and 7? 13 and 7? 3 and 7?

How much are 6 and 4? 16 and 4? 26 and 4? 36 and 4? 46 and 4? 56 and 4? 66 and 4? 76 and 4? 74 and 6? 64 and 6? 54 and 6? 44 and 6? 34 and 6? 24 and 6? 14 and 6? 4 and 6?

5.	6.	7.	8.
64,735	64,735	12,345	99,999
46,375	64,735	98,765	99,991
64,375	46,375	12,345	11,118
46,735	73,915	98,765	82,282
76,635	87,199	12,345	28,829
34,475	19,821	98,765	73,641
36,635	91,284	12,345	37,467
74,475	63,826	98,765	59,513
55,505	47,281	12,345	51,596
00,055	55,559	55,555	55,554

The foregoing examples having been practiced in the class until the columns can be readily added without any counting, let a sufficient number of the following examples for one lesson be assigned, to be transcribed and added by the pupils at their seats. The pupils should be taught to consider that an important part of the lesson consists in neatly transcribing the sums themselves upon their slates; and their work should be carefully inspected, with reference to the clearness of the surface of the slate, the correctness of the form of the figures, the perpendicularity of the columns, and the proper numbering of the several sums. They should also add up the several columns again, in the class, sometimes in concert, and sometimes individually.

In transcribing the examples upon the slates, the pupil should be taught to consider each row of figures, reading from left to right, as *one number*, and take it in his memory as a whole, instead of looking

back and forth continually from his book to his slate to take one figure at a time. To do this, the teacher should direct him to look at the first sum on page 45, and ask what is the number expressed by the upper row of figures. *Ans.* Five hundred and ninety-five thousand, five hundred and nine. Write that number upon the slate. Now what is the next number? *Ans.* Five hundred and fifteen thousand, one hundred and fifty-one. By similar questions and practice, the pupils will soon learn to consider the several rows of figures as expressing each a single number, and will be much aided in the labor of transcribing them.

9.	10.	11.	12.
595,509	595,195	595,599	199,099
515,151	595,915	911,591	911,591
599,955	911,159	199,515	119,515
911,115	119,951	519,555	995,155
195,991	599,195	591,155	155,951
515,519	511,915	119,915	559,999
591,595	195,951	991,199	591,115
919,155	990,159	551,911	519,195
195,951	015,505	559,599	501,919
550,559	555,055	555,051	555,551

13.	14.	15.	16.
205,208	008,255	858,502	585,855
855,582	282,885	050,588	525,555
008,525	852,025	580,525	505,508
852,585	858,525	528,285	020,522
225,528	082,088	882,022	202,508
205,802	228,582	225,858	888,282
882,205	085,028	025,058	202,802
828,555	525,882	280,802	858,828
285,558	082,028	022,025	252,008
005,002	528,202	888,285	808,280
645,650	546,550	466,550	655,652

17.	18.	19.	20.
928,282	212,288	119,219	889,821
189,823	212,128	991,898	211,088
811,212	898,922	829,222	291,282
291,899	189,282	281,869	899,021
999,891	921,828	821,111	218,819
111,218	129,182	289,998	892,292
829,922	981,968	812,112	812,108
288,189	281,128	298,991	208,988
182,901	829,912	912,829	928,122
928,111	112,899	198,281	182,909
892,199	998,211	988,029	902,911
211,928	082,891	122,888	188,191
289,202	820,289	819,022	201,989
820,889	208,029	291,288	829,122
232,331	333,231	223,232	423,338

21.	22.	23.	24.
515,182	200,821	880,182	098,885
590,189	809,281	220,529	502,225
950,921	581,829	118,511	028,991
159,509	521,558	992,091	802,119
921,591	859,552	998,059	082,119
180,818	252,822	115,152	208,991
118,212	218,288	553,988	052,158
990,295	895,218	558,925	008,952
122,855	195,802	282,155	851,822
980,558	910,098	822,808	009,288
805,582	081,512	850,252	252,585
200,925	529,595	250,509	508,525
895,155	595,815	128,581	052,551
210,059	315,295	980,021	508,559
363,331	033,335	254,339	622,230

25.	26.	27.	28.
775,737	931,971	883,322	958,205
337,373	379,031	227,788	103,809
733,755	719,709	773,272	357,991
573,505	391,397	332,837	705,118
557,557	797,313	373,833	205,312
755,353	013,703	737,277	838,792
335,055	331,177	308,783	570,888
377,735	779,933	722,323	552,227
733,077	777,017	782,727	350,253
573,573	337,097	308,383	707,859
507,035	119,903	877,277	883,571
355,555	091,179	233,038	220,531
755,053	917,331	283,872	377,719
335,337	093,701	827,032	733,395
	224,439	323,238	442,335

29.	30.	31.	32.
880,838	730,382	125,873	466,404
220,287	200,722	907,030	664,646
758,123	858,238	830,557	646,664
350,903	302,873	270,553	446,466
732,577	702,577	303,732	664,444
376,009	558,537	750,378	446,666
720,531	503,783	158,057	664,644
387,601	007,329	900,853	464,446
173,879	777,851	770,079	646,664
930,235	303,251	332,231	464,446
187,985	838,079	985,085	046,464
900,121	202,735	125,325	440,046
123,719	191,355	750,078	
900,392	919,029	350,732	
252,378	522,111	253,220	

33.	34.	35.	36.
464,646	194,511	650,016	444,616
646,564	911,091	454,594	606,496
646,545	969,499	540,096	966,494
464,545	140,016	565,519	104,619
065,566	454,644	445,051	599,161
445,664	650,066	660,451	511,945
666,446	566,564	960,019	605,155
644,544	540,049	149,695	465,956
405,565	655,511	411,045	404,464
555,455	455,091	691,664	646,645
554,655	110,459	699,066	106,595
440,445	996,054	414,441	954,519
	944,666	516,569	409,461
	160,046	590,541	651,641
	256,234	255,239	522,239

37.	38.	39.	40.
544,454	411,412	494,866	152,015
566,655	699,096	616,241	906,299
491,645	582,524	625,699	964,521
619,409	528,085	480,419	145,084
114,961	425,515	865,251	805,546
996,104	685,099	240,858	206,068
655,116	649,041	256,102	564,652
455,996	461,668	850,965	504,052
516,504	154,452	184,505	406,468
594,501	956,006	920,546	648,046
449,469	546,654	515,684	522,654
661,605	564,409	590,424	585,054
456,945	661,521	685,516	480,486
654,105	449,586	420,599	625,021
222,355	225,334	252,331	536,239

41.	42.	43.	44.
590,537	905,496	377,508	439,428
679,313	315,024	647,062	946,312
431,795	700,584	463,544	164,792
541,745	456,556	971,006	833,158
569,368	604,055	139,635	277,956
618,452	550,665	136,075	657,674
492,656	500,449	974,408	453,435
395,834	169,071	775,062	995,505
715,277	941,232	335,009	115,564
466,463	606,138	638,941	617,646
644,648	402,771	472,108	493,486
857,672	616,379	576,882	866,224
253,439	494,038	534,221	244,802
333,331	645,332	335,539	333,438

In the following examples the combinations are varied by introducing new and different figures at the bottoms of the columns. The teacher must be careful to practice the pupils in class in adding the columns from the bottom upwards, until they can go up readily without any counting or calculating.

45.	46.	47.	48.
55,555	55,555	11,191	11,999
55,555	55,555	90,919	99,119
55,555	55,555	99,011	10,901
55,555	55,555	11,999	99,119
55,550	55,555	99,011	01,991
50,555	55,555	11,191	19,019
55,555	55,555	99,919	91,991
50,550	55,555	11,111	11,119
55,555	55,555	99,999	99,991
55,555	55,555	11,111	11,119
55,555	55,555	99,999	99,991
42,115	87,655	43,216	86,659

49.	50.	51.	52.
28,088	88,888	77,737	77,777
82,222	22,222	33,373	33,333
28,888	88,888	77,737	77,777
82,222	22,222	33,373	33,333
08,888	82,888	73,307	77,377
22,882	28,222	37,733	73,733
88,228	82,888	73,377	37,337
28,882	28,822	37,773	73,773
22,228	22,228	73,337	37,337
88,882	88,882	77,777	73,773
22,222	22,228	33,333	33,337
88,888	88,882	77,777	77,773
22,222	22,228	33,338	33,337
88,888	88,882	77,777	77,773
10,895	65,448	20,995	65,447

53.	54.	55.	56.
74,222	27,727	29,572	94,835
36,880	63,482	82,538	16,272
43,386	46,628	88,219	98,378
67,724	44,082	23,891	64,739
64,767	64,228	67,811	64,781
46,343	76,882	45,299	48,321
82,648	32,248	45,629	33,169
28,462	38,864	64,481	77,944
26,666	74,446	76,482	77,656
84,444	06,664	37,628	33,453
37,377	22,336	83,398	46,947
73,733	88,773	28,712	64,162
78,378	23,337	12,795	64,598
32,732	87,773	90,315	46,514
21,005	66,447	20,995	65,443

57.	58.	59.	60.
36,472	15,141	66,464	66,666
74,638	95,966	44,646	44,444
53,686	86,234	66,464	64,666
57,424	24,877	44,640	46,444
88,394	83,323	66,466	44,466
22,716	27,788	44,644	66,644
76,717	92,452	66,466	44,446
34,393	18,655	66,664	66,664
44,188	98,565	44,646	44,446
66,922	12,544	66,666	66,664
80,962	64,676	44,444	44,446
22,148	46,433	66,666	66,664
97,234	53,727	44,444	44,446
13,876	57,382	66,666	66,664
90,195	65,446	10,995	65,446

SECOND SERIES.

The following examples contain combinations of numbers entirely different from the preceding. The questions prefixed to the examples may be asked first, and then the class should be practiced in the columns of the sums, going up from figure to figure, naming the successive amounts, but without naming the figures themselves. The sums may be written upon the black-board, and the teacher point to the successive figures, ascending the columns, or the pupils may look upon their books, each keeping the place for himself. The teacher should take care that the examples are thus practiced in the class, both in concert and individually, until the pupils can go up the columns readily, without anything like counting or calculation; and he should only proceed to new examples as fast as those objects are fully obtained.

The pupils should, from this time, be accustomed to prove their work, by adding columns from above downwards, to see if they obtain the same result as by adding from below upwards. As this is the only method of proof ever used by men of business, it is well that the pupils should be early taught to practice it.

And, in all cases, they should have it constantly impressed upon their minds that correctness and certainty, and not speed, are the great requisites after all. They should proceed only so fast as they can go with a certainty that they are right. They must understand that readiness and rapidity are worth less than nothing, unless correct; and that an accountant who adds a column in a minute, but is not sure, when he is done, that the amount is true, is not worth as much as one who spends half an hour in going up the column, but who gets an amount, when he is done, that one can *rely* upon.

Combinations of 2 and 2 and 4.

How many are 2 and 2? and 2 more? and 2? and 2? and 4? and 2? and 2? and 2? and 4? and 2? and 4? and 2? and 2? and 4? and 2? and 2? and 4? and 2? and 4?

61.	62.	63.	64.
222,222	222,022	244,222	422,224
242,422	424,422	220,224	244,242
222,204	222,222	222,022	422,222
420,242	242,244	442,442	222,222
222,422	220,222	222,222	420,224
240,202	422,422	224,224	242,242
224,224	220,222	222,222	424,222
422,242	224,224	442,442	222,422
222,422	242,222	202,222	422,224
242,222	420,422	224,224	242,042
224,242	222,222	202,222	424,222
422,222	242,224	422,442	222,222
222,024	224,242	222,222	422,424
222,422	402,422	200,224	242,242
244,242	222,222	244,222	422,022
422,222	222,224	402,442	224,222
222,222	222,222	220,222	422,224
222,222	422,422	222,222	222,222

Combinations of 2 *and* 2 *and* 6.

How many are 2 and 2? and 2? and 6? and 2? and 2? and 6? and 2? and 2? and 6? and 2? and 6? and 2? and 2? and 6? and 2? and 6? and 2?

65.	66.	67.	68.
622,622	220,202	220,222	622,202
226,226	620,006	202,226	206,266
222,062	206,262	622,622	622,202
622,220	222,022	222,062	262,220
220,600	602,226	226,206	622,622
266,020	266,262	622,222	222,266
620,202	222,022	262,620	662,002
202,066	622,626	226,262	222,222
222,222	266,260	622,200	620,626
606,022	222,222	260,026	206,202
260,660	622,620	222,222	662,062
222,022	262,262	626,262	222,226
622,222	222,620	226,226	626,022
222,026	622,226	222,222	260,662
222,222	626,622	622,262	622,222
622,622	222,222	222,222	222,222

Combinations of 2 *and* 2 *and* 8.

How many are 2 and 2? and 8? and 2? and 8? and 2? and 8? and 2? and 2? and 8? and 2? and 8? and 2? and 2? and 8? and 2? and 8?

How many are 18 and 2? and 2? and 8? and 8? and 2? and 2? and 8? and 2? and 8? and 2? and 2? and 8? and 2? and 8? and 2? and 8?

69.	70.	71.	72.
222,822	822,282	828,822	228,828
882,228	222,020	282,288	882,222
228,222	822,828	228,222	222,282
882,882	222,222	822,828	288,828
222,228	822,888	288,282	822,222
888,882	222,222	222,228	222,282
222,222	882,828	822,822	282,828
822,822	222,222	282,288	828,222
282,222	828,288	228,222	282,282
228,288	222,282	822,222	222,828
222,222	828,222	222,882	222,222
222,222	222,282	222,222	228,822

Combinations of 4 *and* 4 *and* 2.

How many are 4 and 4? and 4? and 4? and 2? and 4? and 2? and 4? and 4? and 2? and 4? and 4? and 4? and 2? and 2? and 4? and 4? and 2? and 4? and 4? and 4? and 4? and 2? and 4? and 2? and 4? and 2?

73.	74.	75.	76.
422,202	400,242	444,242	222,444
444,042	424,204	200,204	424,422
242,220	242,442	442,424	244,244
424,224	400,402	420,202	442,442
242,442	244,442	204,444	224,424
444,444	400,444	440,202	422,224
422,424	444,222	202,244	242,444
444,424	202,424	444,422	442,222
442,442	444,224	424,442	224,444
224,444	442,244	442,244	442,422
422,444	422,444	442,444	242,424

Combinations of 4 *and* 4 *and* 6.

How many are 4 and 4? and 4? and 4? and 6? and 4? and 4? and 6? and 4? and 6? and 6? and 4? and 4? and 6? and 4? and 4? and 6? and 4? and 6? and 4? and 4? and 4? and 6? and 4? and 4? and 6? and 4? and 4? and 6? and 4? and 4? and 6? and 4? and 4? and 6? and 4?

77.	78.	79.	80.
646,444	644,046	640,064	444,064
444,446	606,464	404,466	406,644
444,444	464,044	666,444	644,446
444,444	644,444	444,466	604,444
440,444	464,644	666,444	444,464
444,644	444,444	444,406	464,646
444,444	464,644	464,664	466,444
464,664	444,446	444,446	644,444
444,446	666,664	444,644	644,466
464,464	444,646	444,444	464,644
640,446	444,464	644,444	464,444
444,444	446,446	446,464	446,446
446,644	644,444	446,446	644,464
646,444	464,444	664,444	664,644

Combinations of 4 *and* 4 *and* 8.

How many are 4 and 4? and 4? and 8? and 4? and 8? and 4? and 4? and 8? and 4? and 4? and 8? and 4? and 8? and 4? and 8? and 4? and 8? and 4? and 4?

How many are 14 and 4? and 4? and 8? and 4? and 4? and 8? and 4? and 4? and 8? and 4? and 4? and 4? and 8? and 4? and 4? and 8? and 4? and 8?

81.	82.	83.	84.
884,444	444,444	444,444	440,488
444,444	444,444	844,844	488,848
444,448	848,444	488,484	440,844
448,884	484,888	444,448	884,484
884,444	444,444	444,444	844,488
448,444	444,444	844,844	884,048
444,484	848,444	488,484	448,844
448,448	484,884	444,448	488,884
484,844	044,444	448,484	848,088
844,444	444,448	884,844	884,448
440,448	444,484	448,444	440,444
884,444	884,844	484,484	844,084

Combinations of 6 *and* 6 *and* 2.

How many are 6 and 6 ? and 6 ? and 6 ? and 2 ? and 6 ? and 2 ? and 6 ? and 2 ? and 6 ? and 6 ? and 2 ? and 6 ? and 6 ? and 6 ? and 2 ? and 6 ? and 6 ? and 2 ? and 2 ? and 6 ? and 6 ? and 2 ? and 6 ? and 6 ? and 2 ? and 6 ?

85.	86.	87.	88.
266,226	626,666	266,666	666,626
626,666	266,262	266,666	666,666
666,662	666,626	666,666	226,666
262,626	662,666	622,666	662,262
666,626	626,666	266,662	666,622
626,662	266,262	662,626	666,666
666,626	262,626	666,666	266,666
662,666	666,666	266,266	626,266
266,262	622,666	622,666	662,222
626,626	266,662	266,262	226,666
666,666	626,226	222,626	666,666

Combinations of 6 *and* 6 *and* 4.

How many are 6 and 6? and 6? and 4? and 6? and 6? and 4? and 6? and 6? and 4? and 6? and 6? and 4? and 6? and 6? and 4? and 6? and 6? and 6? and 4? and 6? and 6? and 4? and 6? and 6? and 4? and 6?

89.	90.	91.	92.
466,466	464,604	446,644	646,644
664,066	666,466	644,666	466,666
600,466	666,666	666,666	466,666
666,606	646,666	666,666	464,446
446,664	644,446	444,444	646,666
466,646	444,664	400,664	666,666
666,666	466,666	666,666	660,444
644,464	666,666	666,066	406,666
666,646	664,446	466,666	466,666
444,664	600,666	664,604	464,466
466,646	446,064	404,466	644,044
640,466	666,646	466,666	646,644

Combinations of 6 *and* 6 *and* 8.

How many are 6 and 6? and 6? and 6? and 8? and 6? and 6? and 8? and 6? and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 6?

How many are 16 and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 6? and 8? and 6? and 8? and 6? and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 6? and 8? and 6? and 6? and 8? and 6?

93.	94.	95.	96.
886,868	686,688	686,688	666,668
666,086	666,866	800,668	866,686
666,666	686,686	668,866	666,866
688,668	868,666	666,686	666,666
666,886	666,866	686,666	688,688
866,666	686,688	868,668	886,666
666,668	668,666	666,886	666,866
668,686	866,868	686,666	666,688
686,666	686,686	668,866	888,668
868,668	668,666	866,688	666,866
686,866	866,868	688,666	666,688
666,666	666,666	666,666	666,666

Combinations of 8 *and* 8 *and* 2.

How many are 8 and 8? and 8? and 2? and 8? and 8? and 2? and 8? and 8? and 2? and 8? and 2? and 8? and 8? and 2? and 8? and 8? and 2? and 8? and 8? and 8? and 2? and 8? and 8? and 2? and 8? and 8? and 8? and 2? and 8?

97.	98.	99.	100.
888,022	882,282	022,828	202,028
822,288	888,888	888,282	828,882
888,888	228,288	288,228	888,288
222,822	888,828	882,882	282,888
888,888	882,882	828,888	888,828
822,288	888,288	888,888	820,882
888,822	828,888	288,222	808,288
228,888	282,828	882,888	288,888
882,888	888,882	820,882	888,828
288,222	828,288	228,228	882,282
828,888	288,828	888,282	208,888
882,288	882,288	828,888	888,228

Combinations of 8 *and* 8 *and* 4.

How many are 8 and 8? and 8? and 4? and 8? and 4? and 8? and 4? and 8? and 8? and 4? and 8? and 8? and 4? and 8? and 8? and 8? and 8? and 4? and 8? and 8? and 4? and 8? and 8? and 8? and 4? and 8? and 8? and 8? and 8? and 4? and 8? and 8? and 8? and 4? and 8?

101.	102.	103.	104.
808,080	808,808	444,448	888,808
844,488	884,088	488,888	484,448
488,848	488,844	848,444	848,888
840,084	888,888	884,888	848,084
884,488	840,488	448,444	888,408
888,848	488,844	888,888	484,888
480,404	404,888	884,888	840,840
848,888	888,488	408,444	804,804
888,808	848,844	884,884	848,488
484,884	484,088	804,888	488,888
808,488	808,484	488,888	880,844
848,848	888,048	880,448	804,488

Combinations of 8 *and* 8 *and* 6.

How many are 8 and 8? and 8? and 6? and 8? and 6? and 8? and 8? and 6? and 8? and 6? and 8? and 8? and 6? and 8? and 8? and 6? and 8? and 8? and 6? and 8? and 8? and 6? and 8? and 6? and 6? and 8? and 8?

How many are 18 and 8? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 8? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 6? and 8? and 6?

105.	106.	107.	108.
888,808	688,880	866,668	600,808
868,886	868,688	888,888	888,888
686,088	686,866	600,888	888,888
880,868	888,088	668,666	688,666
868,888	680,888	866,888	666,886
688,068	886,666	888,688	888,868
868,886	868,888	666,866	868,688
886,668	808,688	688,688	686,886
606,888	686,806	866,808	868,066
868,866	888,888	868,066	680,608
608,688	868,668	886,688	666,888

Combinations of 3 *and* 3 *and* 5.

How many are 3 and 3 and 3? and 5? and 3? and 5? and 3? and 3? and 5? and 3? and 5? and 3? and 5? and 3? and 3? and 5? and 3? and 3? and 5? and 3? and 5? and 3? and 5? and 3? and 5? and 3? and 5? and 3?

109.	110.	111.
333,333	553,335	330,333
533,533	335,333	353,353
335,353	333,533	533,535
353,335	333,333	353,333
333,333	535,553	335,353
533,333	333,333	535,535
333,333	333,335	050,033
533,535	550,533	333,353
335,353	335,353	333,333
053,333	333,335	053,535
333,333	530,533	533,053
333,333	333,333	333,333

Combinations of 3 *and* 3 *and* 7.

How many are 3 and 3 ? and 3 ? and 7 ? and 3 ? and 7 ? and 3 ? and 3 ? and 7 ? and 3 ? and 3 ? and 7 ? and 3 ? and 7 ? and 3 ? and 3 ? and 7 ? and 3 ? and 7 ? and 3 ? and 7 ? and 3 ? and 3 ? and 7 ? and 3 ? and 7 ? and 3 ? and 3 ? and 7 ?

112.	113.	114.
330,737	733,733	370,733
777,333	373,377	737,377
333,737	737,733	333,733
777,333	333,377	337,377
333,737	337,733	773,333
773,373	773,337	337,737
337,337	333,333	373,373
373,373	337,337	733,337
337,333	733,773	333,733
033,737	373,337	377,377
373,333	333,773	733,333
337,373	733,337	373,733
333,338	337,373	333,373
733,377	337,337	737,337
373,733	377,033	373,733
333,333	333,333	333,333

Combinations of 3 *and* 3 *and* 9.

How many are 3 and 3 and 3 ? and 9 ? and 3 ? and 3 ? and 9 ? and 3 ? and 9 ? and 3 ? and 3 ? and 3 ? and 9 ? and 3 ? and 9 ? and 3 ? and 9 ? and 3 ? and 9 ? and 3 ? and 3 ? and 9 ? and 3 ? and 9 ? and 3 ? and 9 ? and 3 ? and 9 ? and and 3 ? and 3 ?

115.	116.	117.
393,333	933,399	393,339.
333,993	399,933	333,993
333,339	333,333	333,333
939,333	333,399	999,333
393,993	999,333	333,339
333,339	333,933	939,993
393,333	003,399	393,339
933,393	999,333	339,333
309,333	333,333	393,333
333,939	033,399	933,339
903,333	303,933	933,939
333,333	330,333	333,333

Combinations of 5 *and* 5 *and* 3.

How many are 5 and 5 ? and 5 ? and 3 ? and 3 ? and 5 ? and 3 ? and 5 ? and 3 ? and 5 ? and 3 ? and 5 ? and 3 ? and 3 ? and 5 ? and 3 ? and 5 ? and 3 ? and 3 ? and 5 ? and 3 ?

118	119.	120.
503,503	353,053	503,055
330,055	535,335	535,333
505,553	353,553	353,555
555,335	535,335	535,333
533,553	553,555	553,555
355,555	335,353	335,305
533,333	553,555	553,555
555,555	355,535	335,553
553,553	553,355	553,335
355,535	350,553	335,555
555,353	535,355	000,503
335,555	335,555	553,355

Combinations of 5 *and* 5 *and* 7.

How many are 5 and 5? and 7? and 5? and 7? and 7? and 5? and 5? and 7? and 5? and 7? and 5?

121.	122.	123.
55,557	75,755	77,770
77,575	57,577	55,555
55,057	55,755	75,777
57,775	05,557	57,550
75,555	57,575	55,575
57,557	05,757	77,757
75,775	57,575	05,555
57,555	75,757	57,707
55,557	55,575	05,555
77,775	77,577	75,705
55,555	55,555	55,557

Combinations of 5 *and* 5 *and* 9.

How many are 5 and 5? and 9? and 5? and 9? and 5? and 9? and 5? and 9? and 5? and 9? and 5?

124.	125.	126.
95,999	95,995	55,595
59,555	59,559	99,959
95,959	95,955	55,595
59,595	59,595	95,959
95,050	95,959	59,555
50,555	59,595	95,999
05,099	95,955	59,555
55,550	59,599	95,999
09,055	95,555	59,555
95,999	59,999	95,999
50,555	95,555	59,555

Combinations of 7 and 7 and 3.

How many are 7 and 7? and 3? and 7? and 3? and 7? and 3? and 7? and 3?

127.	128.	129.
37,773	73,777	03,337
73,377	37,337	77,777
30,733	73,773	33,733
77,777	37,337	77,377
30,373	77,773	37,733
77,737	33,337	03,777
30,373	77,773	77,337
73,777	73,737	33,773
77,333	37,077	77,737
33,777	73,773	73,377
77,733	37,337	37,733

Combinations of 7 and 7 and 5.

How many are 7 and 7? and 5? and 7? and 5? and 7? and 7? and 5? and 7? and 5? and 7? and 5?

130.	131.	132.
75,757	77,777	57,577
07,575	77,755	70,755
77,755	55,577	77,577
55,777	07,755	57,755
07,557	77,707	75,577
75,775	75,775	57,775
77,077	57,557	77,557
05,755	75,775	55,777
77,077	57,777	77,557
55,755	77,055	75,775
77,577	75,777	57,757

Combinations of 7 *and* 7 *and* 9.

How many are 7 and 7? and 9? and 7? and 9? and 7? and 9? and 7? and 9? and 7?

133.	134.	135.
79,997	79,777	99,777
97,779	77,779	77,979
79,997	99,797	97,777
77,777	77,977	79,797
79,979	79,799	77,977
97,797	97,777	97,779
77,979	77,797	79,777
07,777	99,979	97,997
79,777	77,777	77,777
77,799	97,779	99,799
97,077	79,997	77,777

Combinations of 9 *and* 9 *and* 3.

How many are 9 and 9? and 3? and 9? and 3? and 9? and 3? and 9? and 3? and 9? and 3?

136.	137.	138.
39,393	99,993	99,333
93,939	93,339	39,999
99,393	39,993	93,333
33,939	93,339	99,999
99,393	99,993	33,333
39,999	33,339	99,999
93,333	99,993	93,933
39,999	33,339	99,399
99,333	99,999	33,993
33,999	33,333	99,939
99,333	99,999	33,399

Combinations of 9 *and* 9 *and* 5.

How many are 9 and 9 and 5? and 9? and 5? and 9? and 5? and 9? and 5? and 9? and 5? and 9? and 5?

139.	140.	141.
99,955	59,959	95,995
55,599	95,595	59,959
99,955	99,959	99,595
95,599	55,595	55,959
59,955	99,959	99,995
99,599	55,599	99,559
59,955	99,955	55,995
95,599	55,599	99,959
59,995	99,995	99,595
95,559	55,559	55,959
99,995	99,995	99,995

Combinations of 9 *and* 9 *and* 7.

How many are 9 and 9? and 7? and 9? and 7? and 9? and 7? and 9? and 7? and 9? and 7? and 9?

142.	143.	144.
77,779	77,999	77,979
99,999	99,797	99,797
79,797	79,979	99,979
97,979	99,999	77,797
79,997	77,797	99,979
99,779	99,979	77,999
77,997	97,799	99,979
99,999	79,977	79,799
79,777	99,999	99,997
97,999	79,779	77,779
79,799	97,999	99,997

THIRD SERIES.

The teacher should now explain to the class that it will often happen that two or more figures will succeed each other in a column, in such a manner that instead of adding them separately, and in succession, they can combine them by a glance of the eye, and add the amount at a single step. This is done most easily when the numbers to be thus grouped form ten. In the following examples such figures are connected by a brace, and the pupils in going up the columns are simply to add ten when they come to the brace, instead of adding the figures within it separately. Thus, in the first example, beginning at the units column at the bottom, they are to say one, six, sixteen, seventeen, nineteen, twenty-nine, &c. After the first nine examples, the braces are omitted, that the pupils may group for themselves, and it would be well for the teacher to write other columns on the black-board, and let the pupils add them up, indicating with a pointer, as they proceed, the groupings which they make. They need not confine themselves to such combinations as make exactly ten. If 3, 1 and 1, succeed each other, they may add the whole as 5, &c. With proper help and encouragement the class will take great interest in these abbreviations, and will make great progress in learning to add with facility.

145.

3	5	2	7
1	0	8	3
8	4	3	4
2	3	2	6
3	2	6	1
2	6	4	2
5	8	6	3
6	2	1	5
7	3	5	5
3	0	4	0
8	7	5	2
1	3	5	1
9	2	2	4
1	5	3	6
2	7	1	5
5	6	7	1

146.

4	2	8	8
5	8	7	2
6	0	6	0
1	9	5	7
6	1	4	6
1	9	6	4
2	2	5	9
3	6	4	1
4	5	5	6
6	4	5	5
8	3	8	8
2	2	3	4
5	6	3	9
6	4	7	1
1	7	2	2
2	3	0	3

147.

6	4	2	2
4	6	8	8
5	2	3	3
6	9	9	4
6	7	1	7
4	3	9	2
9	8	8	6
2	8	7	4
9	6	7	5
1	6	9	5
7	4	2	8
2	4	8	2
7	5	6	6
3	5	6	5
2	3	0	2
1	2	5	7

148.

1	2	8	6
2	3	6	8
7	5	5	7
0	6	4	4
2	1	7	1
6	7	2	5
2	2	3	0
3	1	5	3
5	3	4	3
2	4	1	4
6	5	1	0
5	8	4	2
7	6	5	1
2	3	3	3
6	1	9	5
2	2	2	2
3	7	5	6
3	4	3	8

149.

7	8	9	1
6	4	7	7
9	6	4	2
5	1	4	6
4	3	9	9
2	2	3	5
4	9	3	6
5	8	4	3
3	0	2	1
6	7	9	8
8	2	3	6
7	9	6	7
9	6	5	1
2	3	9	2
5	1	2	5
3	0	3	4
6	5	4	0
5	6	3	2

150.

7	3	4	6
6	3	5	8
9	3	1	5
4	1	3	1
5	8	6	2
2	5	9	9
3	2	8	6
6	3	0	7
5	9	7	3
4	6	9	6
3	5	7	1
3	8	8	2
8	7	6	7
7	4	3	9
9	5	1	6
5	1	1	2
6	2	4	2
8	6	5	0

151.

4	2	1	2
6	9	2	9
4	3	8	7
0	7	9	6
6	5	6	3
3	9	7	1
9	6	8	8
7	3	4	4
3	1	5	3
0	2	1	9
4	9	2	7
6	7	9	8
8	2	3	6
1	5	7	4
1	3	6	2
0	7	4	9
2	6	0	7
9	9	9	6

152.

2	5	9	9
5	9	8	2
7	6	7	7
8	3	3	1
6	1	2	8
4	7	9	7
7	4	5	9
6	6	6	6
5	3	2	5
4	9	2	2
1	2	7	9
3	8	0	8
9	7	9	3
7	9	6	2
8	8	8	1
2	5	3	9
0	4	7	1
6	1	0	0

153.

2	6	3	3
8	5	9	5
7	8	6	8
3	7	4	6
5	3	8	6
9	2	9	9
4	5	5	7
7	9	4	3
6	4	6	5
5	6	9	4
8	3	7	1
1	7	3	2
1	0	9	8
9	9	5	6
3	0	6	9
4	5	8	3
3	6	7	1
9	3	3	2

154.				155.				156.			
1	3	4	3	3	1	4	3	1	9	3	1
4	3	6	7	1	2	9	4	2	1	1	6
6	4	2	9	6	6	3	5	7	3	2	7
2	6	3	6	5	5	7	1	9	4	6	3
7	9	5	1	6	4	2	2	4	4	2	4
3	7	8	2	8	1	6	7	6	9	7	5
6	3	7	5	7	3	8	1	2	8	5	1
5	1	3	6	3	7	4	3	8	6	3	6
4	2	5	4	9	8	5	3	7	4	2	4
3	7	8	3	2	1	6	3	3	5	7	2
7	6	2	8	3	1	2	1	7	5	8	1
9	2	4	7	4	2	8	6	3	3	5	7
2	2	6	3	5	6	7	8	8	3	4	8
8	5	6	2	3	2	3	4	4	4	6	9
9	5	5	5	2	4	4	5	6	6	2	4
4	0	9	4	6	6	9	2	9	4	9	2

When the pupils have attained facility in adding by the preceding methods, let it be explained to them that good accountants sometimes acquire the art of adding two columns at a time. The following examples are intended to introduce the pupils to this practice, that they may understand the nature of it, and find by trial that it is fully within the compass of their powers. The examples are to be practiced in the class, the pupils adding up the double columns thus, (taking the numbers of the first example,) eleven, thirty-two, forty-three, seventy-six, ninety-seven. The class may give the amounts thus, singly or in concert, at the discretion of the teacher.

157.	158.	159.	160.	161.
21	11	21	15	22
33	11	33	15	24
11	22	22	23	16
21	33	12	13	14
11	11	13	11	12

162.	163.	164.	165.	166.
55	11	13	31	24
62	14	14	33	24
11	21	15	45	32
17	33	21	66	44
18	45	17	12	33
12	22	12	19	26
—	—	—	—	—

167.	168.	169.	170.	171.
31	16	33	15	16
22	12	44	16	17
24	21	67	28	84
36	18	18	17	21
11	24	81	91	36
25	32	92	84	15
22	18	10	23	21
33	21	11	15	34
—	—	—	—	—

172.	173.	174.	175.	176.
35	50	12	14	20
20	20	15	15	30
16	18	18	16	18
14	16	21	18	16
12	17	19	24	14
18	15	17	30	19
16	13	14	18	17
11	11	15	14	15
13	12	13	12	13
15	10	11	10	11
—	—	—	—	—

The teacher can continue exercises of this kind, by writing them upon the black-board, or dictating them to the pupils to write upon their slates, as far as he may judge expedient.

SUBTRACTION.

I. *Cases in which the upper figure is always greater than the lower.*

Before proceeding to perform the following sets of examples in Subtraction, the pupils should commit to memory the table placed at the head of each set. The tables may be divided into lessons of a length adapted to the capacity of the class. The pupils should be frankly told, at the outset, that learning these tables is a difficult and irksome task, but one which it is very necessary for them to perform, in order to prepare themselves to go on in what follows, with ease and pleasure. The tables should be recited as follows: one from ten, nine; one from nine, eight, &c. And then, for the second line, two from ten, eight; two from nine, seven, &c.

FIRST TABLE.

	10	9	8	7	6	5	4	3	2	1
1	9	8	7	6	5	4	3	2	1	
2	8	7	6	5	4	3	2	1		
3	7	6	5	4	3	2	1			
4	6	5	4	3	2	1				
5	5	4	3	2	1					
6	4	3	2	1						
7	3	2	1							
8	2	1								
9	1									

The following examples should be given to the class in lessons of a length sufficient to occupy them during the time assigned for study. They should transcribe them on their slates in a neat and perfect manner, and when assembled at the next class meeting, they should recite them either individually or simultaneously, at the discretion of the teacher, beginning at the right hand, thus: one from two, one; one from one, nothing; one from three, two, &c. Thus the recitation will be a very effectual review of the tables, and will make the results, in all the possible cases, very familiar.

1.	2.	3.
987,546,312	978,546,312	739,564,321
111,111,111	222,222,202	333,333,300

4.	5.	6.
126,398,754	965,743,218	765,894,123
024,044,444	555,522,115	662,663,110

7.	8.	9.
321,564,798	268,975,431	865,432,179
110,352,777	138,842,021	523,211,059

10.	11.
4,444,333,221	66,666,655,555
4,321,321,211	65,432,154,321

12.	13.
888,887,777,777	999,999,999,888
543,217,654,321	987,654,321,876

The second table must be committed to memory like the first. The pupils must be told that the work will be still more difficult and irk-

some than in the former case. It would be well to practice each lesson in the class several times, the pupils answering simultaneously, before giving it to them to study at their seats.

SECOND TABLE.

	20	19	18	17	16	15	14	13	12	11
1	19	18	17	16	15	14	13	12	11	10
2	18	17	16	15	14	13	12	11	10	9
3	17	16	15	14	13	12	11	10	9	8
4	16	15	14	13	12	11	10	9	8	7
5	15	14	13	12	11	10	9	8	7	6
6	14	13	12	11	10	9	8	7	6	5
7	13	12	11	10	9	8	7	6	5	4
8	12	11	10	9	8	7	6	5	4	3
9	11	10	9	8	7	6	5	4	3	2

II. *Cases in which the upper figure is sometimes less than the lower.*

The teacher should now explain to the class the method of proceeding when any one of the figures to be subtracted is greater than the corresponding one of the number which it is to be subtracted from. Let a sufficient number of the following examples be performed in the class, upon the slates, or upon the black-board, to render it certain that all understand the method; and then the work being rubbed out, the pupils can begin again with the examples, at their seats, to perform them without assistance.

14. A boy had 23 marbles. He lost 4 of them. How many had he left?

15. A man had 384 books in his library. Of these, only 290 were in good binding. The rest he sent to the binder's to be bound. How many were sent?

16. How many would there have been to be sent, if he had had 375 books in his library?

17. A boy began to read a book which contained 462 pages. After he had read 184 pages, he wished to know how many remained. What was the number?

18. After he should have read 263 pages, how many would remain?

19. In the whole year there are 365 days. In the three summer months there are 92 days: how many does that leave for the remaining three seasons?

20. In the spring and summer there are 184 days: how many does that leave for the fall and winter?

21. In the summer and fall there are 183 days: how many does that leave for the winter and spring?

22. A boy was born in 1825, on the first of January. How old would he be on the 1st of January, 1836?

23. Suppose every month was shortened one day, how many days would there be in a year?

24. Take off one week from January, and how many days would there be left, there being 31 days in January?

25. Take off one week from June, and how many days would there be left, there being 30 days in June?

26. Take off one week from February, and how many days would there be left, February having ordinarily 28 days?

27. Once in four years February has 29 days. How many days would be left, in those years, if a week should be taken off from the month?

28. Mount Blanc, in Switzerland, is 15,304 feet high, and the Catskill Mountains 3,804 feet. How much higher is Mount Blanc than the Catskill Mountains?

29. The White Mountains are 6,234 feet high. How much higher is Mount Blanc than the White Mountains?

30. How much higher are the White Mountains than the Catskill Mountains?

31. A man went out into the fields with his children to shoot some crows, which had been pulling up his corn. When he got out into the field, the crows had gone. The children wanted him to fire his gun into the air, that they might hear it. He told them that he had 23 cents' worth of powder and shot, when he came out, and that if he had fired twice he would only have had 19 cents' worth remaining; and that if they would tell him, from that, what the cost of two charges would be, he would fire. The youngest boy calculated by counting his fingers, and said that the cost of two charges was 5 cents. What should have been his answer?

32. His older brother told him that he could tell

better by counting the posts of a fence near by, as he had not fingers enough. On counting the posts, they found that there were only 15 in sight. How many were wanting to make up the whole number of 23?

33. Some farmer's boys were once getting in hay.

There were some clouds rising in the west which portended a shower. They counted the fork-fulls of hay in one load, and found the number 76. They then began another load, and after they had got 45 fork-fulls up, they wanted to calculate how many more would be required to complete the load. How many were required?

34. Suppose these two loads of hay were all they had, and that they should give one fork-full every day to the oxen, would it last a year? and if not, how many days in the year would be unprovided for?

35. Five young ladies went to take a walk one May morning. They came to a green bank covered with violets. One gathered 10, one 15, one 12, one 7,

and one 20. How many violets had they in all? The young lady who had 12, and she who had 15, dropped theirs into a brook, and lost them. How many violets were then left?

III. *Terms and signs used in Subtraction.*

Explain to the class the sign — called minus, and that such an expression as this, 5 — 2 = 3, means 5 with 2 taken from it, leaves 3, and is to be read five minus two equals three.

QUESTIONS TO BE ASKED IN THE CLASS.

How much is 4 — 1? 7 — 3? 8 — 5? 19 — 1? 20 — 1? 184 — 4? 6 — 2? 14 — 8? 10 — 5? 5 — 5? 1 — 1? 2 — 1? 1 — 0? 7 — 6? 8 — 0? 8 — 8? 3 — 2?

36. 336594 — 225891.

WORK UPON THE SLATE.

(36.)

From 336594
Subtract 225891
There remains 110703

37. 337,912 — 123,456.
38. 211,111 — 200,111.
39. 333,333 — 244,444.
40. 1,000,000 — 999,999.
41. 667,198 — 284,135.
42. 789,123 — 584,219.
43. 824,637 — 799,999.
44. 234,567 — 224,912.

45. 3,000,000 — 102,101.
46. 102,309 — 101,309.
47. 456,842 — 329,144.
48. 666,845 — 315,120.
49. 418,216 — 399,214.
50. 612,369 — 546,218.
51. 613,422 — 313,422.
52. 419,842 — 315,821.

Let the teacher now explain to the class that the number to be subtracted from is called the *minuend*, and that the one to be subtracted is called the *subtrahend*; and that the number obtained by the subtraction is called the *remainder*.

QUESTIONS TO BE ASKED IN THE CLASS.

In this case, viz: 8 *from* 10 *leaves* 2, which number is the *minuend?* which the *subtrahend?* which the *remainder?*

In this case, 10 from 18 leaves 8? 12 from 16 leaves 4?

Let the teacher repeat questions like the above until the terms are perfectly familiar to all in the class, and then let them proceed to the performance of the following examples, writing the names of the terms opposite the several numbers, in the manner exemplified under the first example.

53. From 3,256,154 subtract 250,325.

WORK UPON THE SLATE.

(53.)

3,256,154 minuend.
250,325 subtrahend.
3,005,829 remainder.

54. From 365,981 take 256,580.
55. " 475,824 " 159,210.
56. " 856,381 " 100,000.
57. " 395,284 " 186,393.
58. " 884,391 " 568,842.
59. " 385,384 " 186,185.
60. " 894,111 " 845,364.
61. " 894,112 " 394,368.
62. " 834,112 " 550,999
63. " 672,212 " 112,987.
64. " 100,100 " 99,999
65. " 298,224 " 36,121.

IV. *General Examples.*

66. There was a school of 98 pupils. The teacher said that a certain class, containing 18, might go out upon the green for 10 minutes. How many remained in the room?

67. Of 39 pupils in a school, 20 study the languages. How many are there who study English branches only?

68. In a city school there are 136 pupils; of whom 63 are boys. How many are girls?

69. Forty-three of the boys are over 12 years of age. How many are under 12 years of age?

70. Of the girls, 20 are under twelve. How many are over twelve?

71. If 34 of all the pupils should be absent any one day, how many would be present?

72. In looking over the bills of a school, which contained 235 pupils, it was found that 54 of the scholars had not yet made payment. How many had paid their bills?

73. The sum of all the bills amounted to $3,489,00, and the sum of the bills not paid to $563,00. How much had actually been paid?

74. A certain class in Geography found upon examination, that they had gone over 219 pages of their text-book. The book contained 220 pages. How many pages remained?

75. If they had studied only 197 pages, how many would have remained for them to study?

76. If it require 123 days for the class to study the book, and they have already been employed 97 days, how many days longer will be required, that they may complete the book?

77. A girl at school thought she would keep a record of the number of times she was punctual, and of the number of times she was late. She found that she had been punctual 54 days, and that there were 72 days in the term. How many days had she been late?

78. A boy went with his father on a journey of 275 miles. At the end of the second day he asked how many miles remained for them to travel. His father said that they had already traveled 183 miles; if he subtracted that number from 275, he could tell how much of the journey remained to be performed. What should have been his answer?

79. When within 33 miles of home, on their return, the father asked the boy if he could tell how far they had then traveled in all, going and returning. If the boy answered correctly, what was his reply?

80. They were absent five nights during the journey. For the first night their expenses were $1,33, and the father gave the landlord a two-dollar bill. How much ought he to have received in change?

81. The second night their expenses were $1,56, and the father paid a three-dollar bill. How much should he have received in change then?

82. For the three remaining nights their expenses were $5,87, and the father paid them all out of one ten-dollar bill. How much of the ten dollars remained?

83. All their expenses during the journey were $15,67, and the father took with him $29,63. How much money did he have on their return?

84. A gentleman went to a carpet store and purchased 83 yards of carpeting, which was cut from a roll containing 137 yards. How many yards remained?

85. He was to pay the man for the carpet $62,23, and gave him $70,00. How much should he receive in change?

86. A merchant engaged a carman to bring 203 barrels of flour from the wharf to his store. He brought 111 barrels, and was then taken sick and obliged to leave the remainder to be carried by another man. How many did the second man carry?

87. The two men received $6,24 for their work; of which the first was entitled to $3,45. How much should the second man receive?

88. A merchant paid for a quantity of flour $236,92. After selling a certain part, he found that he had received $142,67. For what sum must he sell the remainder, in order that he may neither lose nor gain by the sale of the flour?

89. In moving one of the barrels from the loft to the lower floor, the head came out, and some of the flour was lost. On weighing the residue it was found that there were 187 pounds. Originally there were 196 pounds in the barrel. How many pounds were lost?

90. There are 365 days in the year, and 52 of them are Sabbaths. How many are week days?

91. If a girl goes to school four terms in the year, each term being eleven weeks long, she will be at school 308 days, including Sabbaths. How many days will she be out of school, there being 365 days in the year?

92. If a boy were to fly his kite with a string 192 yards long, and should let out all the string but 16 yards, how many yards would it be from him to the kite?

93. If he should take in all the string but 23 yards, how many yards would be wound upon his stick?

94. If the boy paid $1,12 for both the kite and string, and 23 cents for the kite, how much did he pay for the string?

95. If he had paid 33 cents for the string, how much would he have paid for the kite then?

96. If a gentleman be required to pay $1,37 for the passage of his boy in a steamboat, and give a three-dollar bill in payment, how much should he receive in change?

97. In a certain school there were eighty-seven boys who proposed to have a game at snow-balling. Nineteen of them were so small that they did not join in the game. How many were there who played?

98. Of those who engaged in the sport, 29 were on one side. How many were on the other?

99. During the game 429 snow-balls were made, but only 67 of them hit any of the boys. How many of the balls were made to no purpose?

100. One Christmas day, one hundred and twenty-three boys were skating on the ice. Forty-four of the whole number passed the day without falling once. The others fell several times. What was the number of those that fell?

101. It was proposed that all should meet for amusement again in the evening. Twenty-seven of the boys said that their parents would not consent to their coming. The rest all came. How many were there in the evening?

102. Of those who skated in the evening, seven found, the next day, that they had taken cold. The rest were as well as ever. How many were there who took no cold?

103. On New Year's night, one hundred and eighty-four boys were on the ice amusing themselves in various ways. Thirty-nine had cut holes through the ice, and were fishing. The others were skating. How many were skating?

104. If a boy should pay 37 cents for a pair of skates, and 15 cents for having straps put upon them, would both cost him $1,12? If not, how much would they cost, and how much change should he receive, if he should give $2,80 in payment?

105. If he should buy some fishing tackle for 39 cents, and should give 87 cents in payment, how much change should he receive?

106. A girl named Sarah had an only brother, to whom she wished to make a present on his birth-day, and to purchase it with her own money. Her mother told her if she would do some sewing for her she would pay her. She made 4 towels for 24 cents, hemmed 2 handkerchiefs for 20 cents, and a pair of pillow-cases for 40 cents. She bought a silver pencil-case for which she gave 75 cents. How much money did she earn, and how much had she left when she had bought the pencil?

107. A boy named Henry wished to have a garden. His father gave him a piece of land, and $1,50 for roots and seeds. Henry bought 9 tulip roots for 25 cents, some dahlias for 30 cents, some morning-glory seeds for 10 cents, some pinks for 8 cents, some marigolds for 6 cents, and some ladies' delights for 12 cents. How much money did he spend for his garden, and how much did he have left?

108. If a squirrel and squirrel cage be both worth $3,76, and the squirrel be worth 87 cents, how much is the cage worth?

109. If a boy should buy the squirrel and cage at the above price, and should give a five-dollar bill in payment, how much change should he receive?

110. If a boy should pay $3,39 for a number of hens, and should give six dollars in payment, how much must he receive back?

111. If the hens were worth $3,74, how much should he receive back?

112. Two boys, James and John, bought some school-books. James gave for his $1,34, and John gave $1,87. How much did John give more than James?

113. Each of them gave a three-dollar bill in payment. How much change must each receive?

114. A gentleman said to his son, "John, I am to-day 43 years old, and you are 34 years younger than I am. Can you tell me how old you are?" The boy took his slate and pencil, and presently gave an answer, which was two too much. What was the boy's answer? and what was his age?

115. James had given to him one dollar. If he should spend 36 cents for a pencil, 6 cents for some marbles, and 12 cents for a penknife, would they all cost 54 cents? and if so, how much would the boy have left?

116. A boy who lived on the bank of a large river thought he would count the vessels that he saw pass in one day, and found that the number was 16. He continued to make his observation every day for a week, and found there were in all 173 that passed his father's house. Of these, 85 went up the stream. How many went down the stream?

117. If 94 had gone up the river, how many must have gone down?

118. He found that 29 of the whole number were ships. How many must have been vessels of less size?

119. If 43 were steamboats, how many must have been sailing-vessels?

120. A steamboat going up a river carried 212 passengers; going down, she carried 187. How many more did she carry up than down?

121. Of the passengers, 21 were children. How many were adults?

122. Of the adults 48 were ladies. How many were gentlemen?

123. From all the passengers the captain received $419. From the adults, that is, from the ladies and gentlemen, he received $397. How much did he receive for the passage of the children?

124. The whole expense of the trip was $125. How much profit did the boat make?

125. A boy bought a little boat and a large shallow basin to sail it in, at a toy-shop, for 23 cents. The price of the boat was 6 cents. What then was the price of the basin?

126. The boy who bought these things was 11 years old. His cousin, who came to see him sail the boat, was 3 years younger. How old was his cousin?

127. They had permission to sail the boat for an hour. They sailed it 20 minutes, and then became tired of it, and wanted to play at something else. How much of their time remained, there being 60 minutes in an hour?

128. Suppose they had had permission to play 2 hours, how many minutes would have remained after 20 minutes?

129. Three children were swinging at a swing suspended from the branch of a tree. They agreed to take turns, and allow each one to have 150 vibrations.

One of the children, named Lucy, was swinging; her brother pushing her and counting. After she had had about 70 vibrations, her cousin came, and she said she would get out and let him have the rest that belonged to her. Her brother stopped her as soon as he could, but not until the number of vibrations was 79. How many would be left for her cousin?

130. A father paid for the tuition of his son, the first four years that he went to school, $96,00, the next three years $120,00. His father was unable to send him to school any more, and the son went into a store. In the course of six years the son paid his father $375,00 of the amount which he had spent for him. How many years did the son go to school? how much did his father pay for his tuition? and what was the difference between what he paid and what his son returned him?

131. A lady went into a store and purchased 3 yards of muslin for 37 cents, 4 spools of cotton for 25 cents, 1 collar for $2,75, one pair of gloves for 50 cents, and a pair of hose for 62 cents. When she reached home she found the hose were moth-eaten, and she returned them and purchased another pair for 42 cents. What did she pay for her articles the first time she went to the store, and what was the difference in the price of the two pairs of hose?

132. A gentleman bought a house, for which he gave $9,500; he also owned a horse and chaise that were worth $375. He made an addition to his house which cost him $1,800, and purchased a carry-all for $500. How much was the house worth when he bought it,

together with the horse and chaise? and how much was the whole worth when he had made the addition and got the carry-all?

133. He was soon obliged to sell the whole establishment for $10,200. How much more did he pay for it than he sold it for?

134. Two boys were sailing over a pond one pleasant summer morning. They saw ten loons swimming upon the water, and at a little distance thirty ducks. Twenty-five tame geese also came from a farmer's barn-yard to sail about on the pond, and find their breakfast. Hearing a noise in the air, the boys looked up and counted a flock of fifty wild geese flying over their heads. How many were there in all?

135. Soon the wild geese had flown out of sight. How many were then left?

136. They heard the report of a gun, and saw a man upon the shore who had fired at the ducks. They immediately dove into the water and disappeared. How many birds were then left?

137. The farmer's wife came to the door of the farm-house and called the geese; they immediately left the water and went home. How many were then left upon the pond?

138. Two boys sailed across a pond and went into a grove to gather beech nuts. There were 82 trees in the grove, and all were beech trees except 21. How many beech trees were there?

139. They found 20 boys there gathering beech nuts, but soon 9 of them went away to school. How many were then left?

140. A man planted in his orchard 100 apple trees, 75 peach trees, and 83 plum trees. The next fall he told his gardener to dig up all that were dead and lay them in a pile in the yard. He then counted the dead trees, and found there were 38. How many were left alive?

141. There were 12 apple trees dead, 14 peach trees, and 12 plum trees. How many apple trees were left alive? How many peach trees? How many plum trees?

142. A gentleman was crossing the Atlantic. He was told that the distance from New York to Liverpool was 3000 miles. When six days out, the captain told him that they had sailed 120 miles each day. How far were they from Liverpool? how far from New York? In three days more, at the same rate of sailing, how far would they be from each place?

143. A lady went to a fair to purchase play-things for her children. She took two dollars. For a doll she paid thirty cents, for a work-bag twenty-three, for a Chinese puzzle forty, and for some peppermints six. How much money had she left?

144. She then purchased a picture-book for eighteen cents, and a ring for twenty-five. How much money remained?

145. A steamboat was ascending the North River

from New York to Albany. There were on board 318 men and 142 women. How many passengers were there?

146. At West Point 33 men and 27 women left the boat. How many passengers remained? How many men and how many women?

147. At Poughkeepsie 53 men and 49 women left the boat. How many passengers then remained? How many men and how many women?

148. At Hudson 62 men and 37 women left the boat. How many men and how many women were still on board?

149. A boy had 3,256 matches to sell. He sold in one day 1,356. How many had he left?

150. A man going up in a balloon found, after he had gone above the clouds for some distance, that he was 3,220 feet above the ground. He descended 320 feet, and reached the clouds. How far were the clouds from the earth?

151. How far would they have been from the earth, if he had had to descend 420 feet before reaching them?

152. If a boy does 5 sums in subtraction a day, he will do 150 in 30 days. Suppose there are 55 school days in his quarter, how many days will there be left for other work?

MULTIPLICATION.

I. *Multiplication by any number from* 1 *to* 6.

The work of learning the Multiplication Table may be much lightened for the pupil by dividing it into sections, so that one limited and definite portion of it may be learned at a time. The table is accordingly given, in the following exercises, in three sections, and the examples for practice which follow each section require only a knowledge of that section.

If the pupils are very young, it may be best to take first a still smaller portion of the table than that which is here given, as the first section; as for instance, as far as to four times four, or even three times three. Whatever part is thus assigned, the pupils should be directed to study it for a time, and then to shut their books and make the table upon their slates, as far as possible from memory. If they need to open the book to finish the work, they should be allowed to do so, the teacher endeavoring to awaken their ambition to be able to do the work wholly without looking at the book, as soon as possible.

The pupils should also be practiced in the class in repeating the table simultaneously. Those who cannot repeat it from memory, should read from the book so as to join with the others, the teacher encouraging them to do without their books as soon, and as much as possible. If a pupil does not know the result in any particular case, it is of no use to tell him to *think*, and thus keep him waiting in uneasiness and perplexity. The result should be given to him at once, as the true philosophy of fixing such facts, is by the power of association, in bringing the combinations repeatedly and frequently before the mind, until the different links of the chain are so strongly connected that when one comes the other will spontaneously follow.

Write from memory the following table:

MULTIPLICATION TABLE.—SECTION FIRST.

1	2	3	4	5	6
2	4	6	8	10	12
3	6	9	12	15	18
4	8	12	16	20	24
5	10	15	20	25	30
6	12	18	24	30	36

QUESTIONS TO BE ASKED IN THE CLASS.

How much is 4 times 3? In writing the result, how much is to be set down, and how much to be carried? How much is to be set down, and how much to be carried, in the case of 5 times 5? 6 times 6? 3 times 3? 5 times 3? 3 times 5? &c.

EXAMPLES.

1. A gentleman had 4 sons. He wanted to give them 25 cents a-piece to expend on a holiday. How much money would it take in all?

The teacher must be very attentive to the manner in which the work of the pupils is performed upon the slate, when presented in the class, so as to make the exercise a means of promoting the progress of the pupils in hand-writing, spelling, punctuation, and in the power of executing such work in a neat and systematic manner. The following is a model of the manner in which the work, for the above example, should be performed. The other examples are, at the outset, very simple; made so, in order that the attention of the pupil may be mainly directed to the manner of performing and writing the work.

(1.)

4 No. of sons.
25 Amount to be paid to each.
1,00 Total.

It will be observed that in the above case the multiplier is placed above the multiplicand. The pupil should be taught to multiply upwards and downwards indifferently.

2. A certain boy has a kite-string 325 yards long. In each yard there are 3 feet. How many feet long is the kite-string?

WORK UPON THE SLATE.

(2.)

325 Length of string in yards.
3 No. of feet to the yard.
975 Length of string in feet.

3. A boy walked 4 miles one afternoon. In each mile he took 2336 steps. How many steps did he take in all?

4. His sister, who went with him, took 3125 steps in each mile. How many steps did she take in all?

5. A peasant bought a donkey at the fair, and stopped to show him to his neighbors on his way home. They asked him how much the animal cost? The peasant replied, If you multiply the number of his ears by the number of his ears and legs added together, and that

product by the number of his eyes, you will get one-half the price. What was the whole price?

6. His neighbor, who was an old farmer, said that there was a quicker way of making the calculation: Multiply three times the number of his legs by twice the number of his ears, and that will give you the price. Was the farmer right?

7. There is a certain city which contains 15,362 houses. How many inhabitants will there be if there are, on an average, 5 inhabitants to each house?

8. An old man, who was blind, had a little dog to lead him about. The dog took short and quick steps,

while the old man's steps were long and slow. The man took 1980 steps in a mile, while the dog took 3220. How many steps would each one take in going an hour, supposing they traveled three miles in an hour?

9. How many would both take in a day, if they traveled 6 hours in a day?

10. In going across a wooden bridge, the man lost his cane accidentally through a crack. The cane floated down the river at the rate of two miles an hour, for a day and a night—that is, for 24 hours—when it lodged upon the shore. How far down did it go?

11. The old man traveled down the river by a road along the shore for 5 days, going 6 hours a day, at the rate of 3 miles an hour. How far down did he get? Was he then above or below the place where his cane stopped?

12. A gentleman was intending to build a block of four houses. The mason calculated that fifty-four thousand bricks would be required for each house. How many bricks would be necessary for the whole?

13. A gentleman once took his four children with him on an excursion. It cost, for each one of the party, 2 cents to cross a ferry, 15 cents for refreshments, and 62 cents for the fare in the cars on a railroad. How much was the whole cost?

The several items of cost should be added together first, and the amount multiplied by the number of persons in the party.

II. *Terms and Signs used in Multiplication.*

Let the teacher here explain to the class that the sign for multiplication is this $\times$; that 4×3 means four multiplied by three, and this expression, $2 \times 3 \times 4$, means two multiplied by three, and that amount multiplied by four, which makes twenty-four.

Also that the number which we multiply is called the ***multiplicand***, the number which we multiply by, the ***multiplier;*** and the number which we obtain by the multiplication the ***product***.

QUESTIONS TO BE ASKED IN THE CLASS.

If we multiply 4 by 3, we obtain 12. What is the multiplicand in this case? What is the multiplier? What is the product?

What is the multiplicand in this instance, viz: five multiplied by two gives ten? What is the multiplier? What is the product?

In this example, 4×2? 6×1? 3×5? 4×3?

In the following examples the pupils are to write the words *multiplicand*, *multiplier* and *product*, upon their slates opposite the respective numbers; the number of the example being placed at the top, thus:

WORK UPON THE SLATE.

(14.)

435,365,241 *Multiplicand.*
3 *Multiplier.*

1,306,095,723 *Product.*

14.	435,365,241 × 3.	23.	364,263,212 × 3.
15.	432,113,354 × 5.	24.	461,001,313 × 2.
16.	561,432,153 × 6.	25.	264,565,423 × 1.
17.	421,346,161 × 2.	26.	361,265,324 × 5.
18.	666,345,213 × 3.	27.	656,321,121 × 2.
19.	555,555,555 × 5.	28.	564,321,113 × 3.
20.	666,666,666 × 5.	29.	605,060,516 × 6.
21.	363,666,333 × 6.	30.	635,051,111 × 2.
22.	660,606,060 × 2.	31.	606,356,662 × 3.

32. 505,050,505 × 5.

III. *Multiplication by any number from* 1 *to* 9.

The following section of the table should be studied by the pupils, repeated in the class, and copied upon the slate from memory, as in the former case, until it is perfectly familiar to all.

Write from memory the following table:

MULTIPLICATION TABLE—SECTION SECOND.

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
3	6	9	12	15	18	21	24	27
4	8	12	16	20	24	28	32	36
5	10	15	20	25	30	35	40	45
6	12	18	24	30	36	42	48	54
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81

In performing the following examples upon the slate, the proper verbal explanations must be appended to the several numbers used, as in addition and subtraction. The object of these examples, it will be perceived by the teacher at once, is not merely to exercise the power of multiplying, but to form in the pupils, at the outset, the habit of working understandingly, by calling their attention, in every case, to the precise nature of every number that they use, and to the meaning and intent of each step. This habit, once formed, will be of incalculable benefit to them in all the subsequent stages of their progress.

EXAMPLES.

33. A gentleman built a boat. There were 4 oars on each side. Each oar cost $1,25. What was the cost of all?

(33.)

4 No. of cars on each side.
2 No. of sides.
8 No. of cars in all.
1,25 Cost of each car.
10,00 Total cost.

34. A gentleman built a house. It contained fourteen windows, with eight panes of glass in each. How many panes were there in all?

35. Suppose the wheel of a carriage turns round 1,365 times in going one mile, how many times will it turn in going nine miles?

36. How many times will it turn in going 7 miles?

37. There are 1,440 minutes in a day. How many minutes are there in a week?

38. How many minutes are there in a month, if we call a month four weeks?

39. The teacher of a school took out his scholars one holiday on a party of pleasure. There were 35 boys in all. Each boy ate two apples and saved the seeds. There were nine good seeds in each apple. They concluded, when they came home, to sow these seeds in a garden. Suppose the plants should all live and grow, how many trees would they make?

40. Suppose each one of the trees should bear seven apples the first bearing year; how many apples would there be?

41. Suppose that each of these apples contained 9 seeds; how many seeds would there be in all?

42. There is a garden containing 8 apple trees, with an average of 256 apples on each tree. How many are there in all?

In the following cases the words *multiplicand*, *multiplier* and *product* should be written by the pupil opposite the respective numbers, in performing the work.

43.	21,394,216 × 5.	52.	36,942,134 × 7.
44.	32,154,679 × 8.	53.	11,221,198 × 8.
45.	70,980,098 × 9.	54.	21,236,789 × 8.
46.	34,567,891 × 7.	55.	54,321,678 × 8.
47.	33,671,845 × 3.	56.	53,632,891 × 8.
48.	55,555,555 × 6.	57.	55,555,555 × 5.
49.	98,765,432 × 7.	58.	23,456,789 × 7.
50.	54,321,234 × 6.	59.	54,732,145 × 7.
51.	67,839,412 × 8.	60.	81,123,547 × 7.

61. 66,766,789 × 3.

IV. *Multiplication by any number from* 1 *to* 12.

The pupils should now be encouraged to attempt making the Multiplication Table, complete, upon their slates: the teacher endeavoring to interest them all in acquiring the power of writing in all the numbers, from memory, as soon as possible. He should also take particular notice of the manner in which the work is performed, the perpendicularity of the lines, and the correctness of the forms of the compartments, and of the figures. The more advanced and dexterous may be allowed to attempt to draw ornamental borders, &c., one great object being to interest them in acquiring the art of executing such work in a neat and systematic manner. The practice of making multiplication tables is also excellent as a means of cultivating the habit

of patient attention, and of caution in respect to making mistakes; the pupils feeling constantly the necessity of this caution on account of the difficulty experienced in effacing an error in so small a compartment. Great care will be necessary not to discourage and dishearten the less skillful; and in fact, in general, it will be better for the teacher to say but little about faults, but instead of that, find as many excellences as possible to commend, and to let his instructions take the form of showing the pupils how to rule and divide the lines, &c., and how to put in the figures in the best way, by working himself upon the black-board or slate, in their presence, rather than by criticisms upon what they have themselves done.

After the pupils have learned to do this work properly upon their slates, it will be well, if the arrangements of the school favor it, to allow them to make a copy of the table upon paper to take home to their parents, as an evidence of their patient fidelity in the discharge of their duties at school.

MULTIPLICATION TABLE—COMPLETE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

62. A builder was once going to erect a block of stores. He calculated that it would take 35,360 bricks for one store. How many would it take for the whole block, if it should contain 7 stores?

63. How many would it take, if the builder should have nine stores in his block?

64. If there were 167 windows in the whole block, and 12 panes of glass in each window, how many panes would there be in all?

65. What would be the cost of all this glass, at 6 cents for each pane?

66. How much would it cost to set the glass, at 2 cents each pane for setting, and 1 cent for putty?

67. How many sashes would be required, at the rate of 2 sashes for each window?

68. How much will it cost to supply a large city school, containing 325 scholars, with slates, each one to cost seven cents.

69. A scholar was once tardy at school because he loitered by the way, so that he lost nine minutes. How many minutes would have been lost if all the scholars had been tardy in the same way? There were three hundred and fifteen scholars in the school.

70. How many minutes would that boy have lost if he had been tardy as many minutes every day for a year, there being 365 days of the year, and 52 of them to be taken out for the Sundays?

71. Some children, playing in a parlor in a city, one rainy day, wished to calculate how many persons went by their house in a day. They counted for a quarter of an hour, and found that there were one hundred and sixty-three. At that rate, how many would there be in an hour?

72. How many would there be in twelve hours?

Multiply the following Cases:

73.	5,781,231,125 × 3.	87.	9,090,908,080 × 9.
74.	3,698,123,567 × 4.	88.	1,234,567,890 × 7.
75.	3,721,864,213 × 2.	89.	1,234,567,890 × 8.
76.	1,122,334,455 × 9.	90.	1,234,567,890 × 9.
77.	9,876,543,210 × 7.	91.	3,452,367,123 × 10.
78.	9,999,999,999 × 7.	92.	1,134,213,910 × 11.
79.	8,888,888,888 × 7.	93.	3,467,849,212 × 12.
80.	7,777,777,777 × 7.	94.	5,678,910,312 × 11.
81.	6,666,666,666 × 7.	95.	4,528,322,134 × 12.
82.	5,555,555,555 × 7.	96.	5,367,421,321 × 4.
83.	4,444,444,444 × 7.	97.	4,521,364,532 × 3.
84.	3,333,333,333 × 7.	98.	5,391,246,234 × 5.
85.	2,222,222,222 × 7.	99.	5,321,942,352 × 4.
86.	1,111,111,111 × 7.	100.	3,619,854,912 × 3.

V. *Multiplying by* 10, 100, 1000, &c.

Let it be explained to the pupil, that in multiplying by 10, 100, 1000, &c., all that is necessary is to append as many ciphers to the multiplicand as there are ciphers in the given multiplier.

Questions to be asked in the class.

How much is ten times four? five? six? seven? nine?

How much is ten times 21? 42? 34? 61? 70? 20? 21? 35? 66? 72? 58? 94? 54? 88? 92? 31?

The teacher should explain to the class, before assigning to them the following examples, that when the multiplier consists of one significant figure with ciphers annexed, we multiply the multiplicand by the significant figure, and annex the ciphers.

EXAMPLES.

101. There was a company of soldiers consisting of 300 men. Their guns cost $12 each. What was the cost of the whole?

WORK UPON THE SLATE.

(101.)

12 Cost of each gun.
300 Number of men.
3,600 Whole cost.

102. In England there is a certain gold coin used, which is called a sovereign. There is also a piece of silver money, called a shilling, though the English shilling is different from the shillings of this country. It takes exactly twenty English shillings to make a sovereign. How many shillings will there be in 252 sovereigns?

103. A man once carried a bag of sovereigns to the bank. It contained 453. How many shillings were they worth?

104. In reckoning in England, the value of the sovereign is called a pound. So they say twenty shillings make a pound. How many shillings in 3,394 pounds?

105. A boy once had a hive of bees. He watched one day with his mother to see how many bees would come into the hive in a quarter of an hour. There were two hundred and forty-three. At this rate, how many would there be in an hour?

106. How many would there be in a day, calling the working day of the bee twelve hours?

107. The boy then watched one of the bees as he flew from flower to flower, and found that he visited two flowers every minute. Suppose each bee was out half of the time, for the twelve hours, how many flowers would he visit during the day? There are sixty minutes in an hour.

108. Suppose there were 2,500 bees in each hive, and each one should make one excursion every hour, for 12 hours, how many excursions would they make in all?

109. Three ships set off on an expedition. There were in the three ships 1,859 men. The voyage was to be so long, that the commander concluded to have a supply of provisions for each man for 50 days. How many days' provisions would that be in all?

110. How many would have been required, if the supplies had been intended for a voyage of 60 days?

Explain to the pupils, that where there are ciphers both in the multiplicand and in the multiplier, only the significant figures are to be multiplied, and the ciphers in both factors annexed to the product.

111. A fire company went on an excursion into the country. The fare in the cars was fifty cents. There

were three hundred men in the company. What was the whole number of cents expended?

WORK UPON THE SLATE.

(111.)

300 *No. of men.*
50 *Fare each in cents.*
15,000 *Total cost in cents.*

112. A boy once resolved to read twenty pages every day for a year. How many pages would he have read, if he kept his resolution, Sundays included, there being, in that case, 365 days in the year?

113. How many would he have read, if he did not include the Sundays, there being, generally, 52 Sundays in the year?

VI. *Multiplying by numbers expressed by two or more significant figures.*

Explain now to the pupils, while in the class, the method of multiplying, where there are several significant figures both in the multiplier and multiplicand, by placing the products obtained by each successive figure of the multiplier one place farther to the left. They should write the work upon the slate, in each of the following examples, in the manner exemplified under the first one, putting in all the ciphers at first, and omitting them afterwards when they fully understand the origin and meaning of each of the several lines of products as component parts of the general result.

114. Multiply 3,654 by 23.

WORK UPON THE SLATE.

(114.)

3654	*Multiplicand.*
23	*Multiplier.*
10962	*3 times the multiplicand.*
73080	*20 " " "*
84042	*23 " " "*

115.	Multiply	4,679	by	23.
116.	"	36,542	"	14.
117.	"	59,786	"	189.
118.	"	39,784	"	3,214.
119.	"	86,456	"	428.
120.	"	899,786	"	987.
121.	"	32,142	"	3,021.
122.	"	45,672	"	102.
123.	"	25,413	"	111.
124.	"	78,565	"	101.
125.	"	987,645	"	1,002.
126.	"	854,321	"	3,021.

VII. *General Examples.*

127. If a clock ticks twice in every second, how many times will it tick in an hour? There are sixty minutes in an hour.

128. If it ticks so many times in an hour, how many times will it tick in a quarter of a day, there being six hours in a quarter of a day?

129. If it ticks so many times in a quarter of a day, how many times will it tick in a whole day, there being four quarters in a day?

130. If it ticks so many times in a day, how many times will it tick in a week, there being seven days in a week?

131. If it ticks so many times in a week, how many times will it tick in a month, there being four weeks in a month?

132. If it ticks so many times in a month, how many times will it tick in a year, there being twelve months in a year?

133. A boy named James was sailing a little ship upon a pond of water, when a wagoner's son, who happened to be passing with a team, came out to see it.

While looking at it, he asked James if it was not a great deal of work to make all those sails? Why, you see, said James, there are three masts with three sails on each mast, and one besides for the bowsprit. Each sail has four edges, except the one on the bow-

sprit, which has three, and I think there must be as many as one hundred stitches on each edge. Now calculate how many stitches I had to take.

134. Suppose there are 13 seeds in every apple, and 250 apples in a barrel, how many seeds would there be in a barrel of apples?

135. Suppose there are 3 barrels of apples upon a tree, how many seeds will there be upon a tree in one year?

136. Suppose the tree were to flourish 23 years, bearing 3 barrels of apples every year, how many seeds would it have produced in all that time?

137. Suppose that instead of one tree there had been an orchard of 165 trees; how many seeds would have been produced?

138. There was a class of 25 formed in a school to study geography. The geography cost 37 cents, and the atlas to accompany it 87. What would it cost to supply the class, on the supposition that one was wanted for the teacher?

WORK UPON THE SLATE.

(138.)

Cost of Geography,		37
" Atlas,		87
In the class,	25,	124
Teacher,	1,	26
		744
		248
		3224

Explain to the pupils the manner in which the mutiplier 26 is obtained by adding 1 to 25, in what is called an *inner column*, as shown above.

139. Suppose that the geography were to cost 90 cents, and the atlas $1,25, what would be the cost?

140. Suppose the geography were to cost 87 cents, and the atlas $1,37, what would be the cost?

141. A merchant imported 29 boxes of oranges. There were 327 oranges in each box. How many were there in all?

142. How many strokes will a clock strike in a week?

Explain to the class that they are to write down the number of strokes which the clock strikes each hour, for twelve hours, and then multiply the amount by two for the day, and then by seven for the week.

143. How many strokes does a clock strike in a year, there being 52 weeks in a year?

144. How many strokes does a clock strike in a century, there being a hundred years in a century?

145. A boy had a poultry-yard, containing 23 hens. If each hen laid an egg every day, for four weeks, how many eggs would he have in all?

146. How many eggs would he have, at this rate, in seven weeks?

147. If all the hens were to set, and hatch out broods averaging 12 chickens, how many chickens would he have?

148. A boy once had a rocking-horse which he borrowed of his cousin. Pretending to be running a race, he rocked too violently, and threw himself over the horse's head upon the floor. He broke the bridle by this means, and it cost him 7 cents to get it mended. This was one-third part of what the bridle originally cost. The saddle cost eight times as much as the bridle, and the rocking-horse itself eight times as much as the saddle and bridle put together. How much did the horse, saddle and bridle cost?

149. A farmer's boy bought an egg of his father for a cent. He wrapped it up in cotton, put it in a basket, and kept it warm in the mouth of the oven till it was hatched. After a time, he sold the chicken for fifteen times as much as he gave for the egg. With this money, he bought a pair of young turkeys, and when they were fat he sold them for ten times what he gave for them. With the price of the turkeys he bought a lamb, and finally sold the lamb for eight times what it cost him. How much money did he have at last?

150. How many minutes will it take to do one hundred and fifty sums in multiplication, if each sum takes eight minutes?

The first case which the teacher should explain to the class is where each figure of the number to be divided will exactly contain the number which it is to be divided by. In this, and in all subsequent explanations, he should carefully distinguish between the process itself, and the reasons or ground on which the method is founded, and not enter upon the last till the first is clearly understood. There are indeed some minds so clear in their habits of thinking, and so well disciplined, that they may be led to see and comprehend the method of procedure in arithmetical processes, at the outset, as a matter of philosophical deduction from the nature of the numbers and the conditions of the problem. But with the great mass of pupils this object is not to be attempted. The *mode* is first to be made perfectly familiar, and the *reasons* for it to be reserved for subsequent explanation. This gives to the mind of the pupil one simple object of attention at a time, and saves a great deal of mental perplexity and confusion.

The teacher should then show to the class how to perform the division, in some of the cases which follow, doing the work first himself, in their presence, upon the black-board, and afterwards letting them attempt it upon their slates; and when they understand the mode, assign a certain number of the examples which follow, as a lesson.

EXAMPLES.

1. Two boys went out into the woods to get nuts. They filled their pockets, and on counting the nuts when they got home, they found 246. How many would there be a piece, if they were divided equally?

WORK UPON THE SLATE.

(1.)

No. of boys, 2) 246 Number of nuts.

123 Share of each boy.

2. A gentleman gave his three boys a sum of money to expend on a certain holiday. It was to be divided equally among them. On counting the money, they found exactly sixty-nine cents. How much was there for each?

3. How much would there have been if the money had amounted to sixty-six cents?

4. How much, if it had amounted to 36 cents?

5. A man built four small houses, just alike. There was a chimney in each, and the whole number of bricks used was four thousand eight hundred and eighty. How many bricks were used for each chimney?

6. A boy took 4860 steps in walking 2 miles. How many steps is that for a mile?

7. A boy took 2440 steps in walking a mile. How many is that for half a mile?

8. A boy had a poultry yard, in which were 5 hens. After some weeks he counted the eggs and found 55. How many had each hen laid, upon an average?

9. A boy had a bag of acorns, containing 448, which he was going to divide so as to give himself and his brother equal shares. How many acorns would there be in each share?

10. After they had divided them once, their two cousins came to see them, and they concluded to divide the acorns again, and into four shares, so as to give to their cousins portions equal to their own. How many would there be now in each share?

Let the teacher now explain to the class the method of proceeding where any one of the figures is not exactly divisible, so that a remainder is left to be combined with the figure following; and let a sufficient number of examples be performed in the class to render it certain that all understand the process. A good method of doing this, will be for the teacher himself to perform the work of the first example upon the black-board, explaining in a very distinct and deliberate manner all the steps of the process. Then, after rubbing out the work upon the board, let him give the same example to the class, requesting the pupils to rise when they have finished it. Those that seem at a loss should be assisted, and after a reasonable time the answers of those who have succeeded should be reported, either individually or in concert, as may seem most expedient to the teacher. It is not necessary to examine minutely, and criticise, the work of those who have not succeeded; as the object to be accomplished can be secured far more easily and pleasantly to all concerned in another way: that is, let the work upon the slates and black-board be all rubbed out, and then let the teacher take the second example, and perform it in as slow and deliberate a manner as he had done the first, explaining the successive steps very distinctly, and questioning those who had failed before upon his explanations, so as to secure their attention particularly. After having completed the explanation and the work, let him rub out his own figures, and give the same example to the class, asking them to rise as fast as they perform it, as before. He will probably find that on this second attempt a greater number will be successful than at first. This process is to be repeated until all or nearly all the class understand what they are to do. Nothing is to be said to them implying that the teacher is surprised that they do not understand it more readily, as this would only increase the embarrassment and perplexity of those who find the work difficult. On the other hand, they should be told by the teacher that he expects to find it necessary to explain it to them many times before they can clearly comprehend and remember it. At length, when all the class understand the process, a sufficient number of the following examples, including those which have already been performed in the class, are to be assigned as a lesson.

EXAMPLES.

11. A boy had 54 marbles which he put in 3 bags, an equal number in each bag. He gave one of these bags of marbles to his cousin. How many marbles did his cousin receive?

12. Some boys playing in a parlor, on a rainy day, counted the panes of glass in all the windows, and found that there were 96. How many panes were there in each window, supposing that the number of windows was 4?

13. How many panes would there have been if the number of windows had been 8?

14. There was an estate to be divided among 3 heirs. The estate consisted of a house and land worth $2,400, a farm worth $1800, and money in a chest amounting to $900. How much was each heir's share?

Explain to the pupils that they may either divide the separate items separately, and then add together the amounts, or they may add the amounts together first, to get the whole value of the estate, and then divide once for all. In either case, the work must be neatly arranged upon the slate, with words appended to the several numbers explaining distinctly the several successive steps.

15. Four boys went into an orchard to pick up the apples that remained after the farmer had finished his gathering of the fruit. They agreed to divide equally all that they should get. On counting the apples in their baskets, when they got home, they found that one boy had 256, another 364, another 120, and another, who was a very small boy, 64. How many did each boy have, after the apples were equally divided?

16. Suppose that all these apples were to be divided among 3 boys, how many would each one receive?

17. A man was going a journey of 245 miles. He was going to set out on Monday morning, and he wished to reach the end of his journey on Monday evening of

the next week, and not to travel on the Sabbath. How many miles would he have to travel, upon an average, each day?

18. He was to travel on foot, though he expected to get a ride sometimes on the road. He had $5,76 when he set out. How much would that enable him to expend each day, including the Sabbath?

19. The first day he traveled 41 miles, having been carried 20 miles in a wagon. How many miles a day would he have to travel for the remaining 6 days?

20. The first 4 days he expended exactly one dollar per day. How much would he have to expend for each of the remaining 4 days?

21. A boy went to take a ride upon a pony. His father told him that he might ride half an hour. He

said, however, that he must turn to come back when half that period had expired, so as to allow time to come home. How long could the boy go on riding before he must turn, there being 60 minutes in an hour?

II. *Terms and signs used in Division.*

Explain to the pupil that there are two modes of indicating division. One by placing the number to be divided above the number it is to be divided by, with a line between: thus, $\frac{34}{2}$, which is to be read ***thirty-four divided by two.*** The other method is by placing the number to be divided ***before*** the number which it is to be divided by, with this sign between them, viz: $\div$. Thus $34 \div 2$, means the same as the above, and is to be read, ***thirty-four divided by two.***

Explain also that the number to be divided is called the ***dividend***, the number which it is to be divided by, the ***divisor***, and the number of times which the dividend contains the divisor, is called the ***quotient***; and also, that what is left not divisible at the end of the operation, is called the ***remainder.***

Then let the pupils perform the divisions indicated by the following expressions, writing the names of the several terms, as exemplified under the first two of the examples following.

22. $\frac{36,459}{2}$ 23. $\frac{145,698}{3}$

WORK UPON THE SLATE.

(22.)

Divisor, 2) 36,459 Dividend.

Quotient, 18,229

Remainder, 1

24. $\frac{4,521,369}{2}$ 28. $\frac{21,210,210,123}{7}$

25. $\frac{3,264,458}{3}$ 29. $\frac{86,848,328}{2}$

26. $\frac{25,122,789}{4}$ 30. $\frac{999,999,999}{3}$

27. $\frac{150,220,365}{5}$ 31. $\frac{446,248,144}{4}$

32.	89,120,100 / 6	38.	86,384,389 / 5
33.	1,000,000,000 / 8	39.	121,224,384 / 2
34.	66,232,666 / 2	40.	122,679,121 / 3
35.	1,000,000,000 / 6	41.	2,324,269 / 7
36.	84,928,784 / 8	42.	888,388,248 / 8
37.	1,000,000,000 / 9	43.	369,246,244 / 9

Remind the pupils that the following cases differ from the foregoing only in the difference of the method of notation which is used to indicate division.

44.	367,894,521 ÷ 2.	53.	214,564,321 ÷ 5.
45.	200,000,000 ÷ 3.	54.	678,452,219 ÷ 6.
46.	200,000,000 ÷ 6.	55.	365,789,210 ÷ 8.
47.	200,000,000 ÷ 9.	56.	444,333,222 ÷ 2.
48.	100,000,000 ÷ 3.	57.	100,000,000 ÷ 5.
49.	100,000,000 ÷ 6.	58.	300,300,300 ÷ 3.
50.	100,000,000 ÷ 9.	59.	200,100,000 ÷ 6.
51.	987,654,321 ÷ 9.	60.	184,229,220 ÷ 7.
52.	219,345,232 ÷ 1.	61.	194,221,380 ÷ 9.

III. *Explanation of the process of Division.*

It will greatly aid the pupils in learning how to perform what is called Long Division, if they are first made to understand fully the philosophy of the process by which the foregoing examples have been performed. For this purpose let the teacher write upon the black-board, or if he has no black-board, let the class write upon the slates, the following example, and then let questions upon the successive steps be asked and answered, as given below; the teacher, as he asks the questions, pointing to the successive figures in the example, to which they respectively relate.

EXAMPLE FOR ILLUSTRATION.

$$2\overline{)5,894}\quad 2,947$$

How many thousands are there in the dividend in this example? *Ans.* Five.

How large a part of five can be exactly divided by two? *Ans.* Four.

If we then divide the four thousands into two parts, how many thousands will there be in each part? *Ans.* Two.

Where is the two to be written? *Ans.* In the quotient.

And how many thousands will remain undivided? *Ans.* One.

How many hundreds are there in this one thousand? *Ans.* Ten.

How many hundreds are there in the hundreds' place in the dividend? *Ans.* Eight.

The ten hundred which came from the remaining thousand, and the eight hundred in the hundreds' place, make how many? *Ans.* Eighteen.

Eighteen what? *Ans.* Eighteen hundreds.

What part of eighteen can be exactly divided by the divisor 2? *Ans.* The whole.

Dividing eighteen hundreds into two parts, how many will there be in each part? *Ans.* Nine.

Nine what? *Ans.* Nine hundreds.

How many remain from the hundreds undivided? *Ans.* None.

What is the next denomination to be divided? *Ans.* Tens.

How many tens are there in the dividend? *Ans.* Nine.

What part of nine can be exactly divided into two parts? *Ans.* Eight.

If eight is divided into two equal parts, how much will there be in each? *Ans.* Four.

Four what? *Ans.* Four tens.

Where is the four to be written? *Ans.* In the quotient, in the place of tens.

How many tens remain undivided? *Ans.* One.

How many units are there in one ten? *Ans.* Ten.

How many units are there besides in the units' place? *Ans.* Four.

Ten units and four units make how many? *Ans.* Fourteen.

How large a part of fourteen can be exactly divided into two equal parts? *Ans.* The whole.

If fourteen is divided into two equal parts, how much will there be in each? *Ans.* Seven.

Where is the seven to be written? *Ans.* In the quotient, in the units' place.

The class ought to be carried through a great number of examples in this way, dividing by 2, 3, 4, 5, &c., until the philosophy of the process becomes perfectly familiar to every mind. A great deal of delay and perplexity in learning Long Division will be saved by dwelling long on the nature of the process as exemplified in simple examples like the foregoing. Several lessons ought to be devoted to this subject, the pupils, while in class, going over the examples in the manner exemplified above, and at their seats performing similar examples assigned them by the teacher. This he can do very rapidly by dictating several large numbers, and directing the class to divide them successively by 2, 3, 4, 5, &c., thus:

Divide each of the following numbers by 2, 3, 4, and 5.

62.	367,289,451.	67.	210,365,285.
63.	221,218,112.	68.	912,214,368.
64.	235,110,100.	69.	145,689,214.
65.	300,300,000.	70.	224,896,214.
66.	345,678,123.	71.	345,219,100.

IV. LONG DIVISION.

Let it now be explained to the pupils that there is a way by which the work, as performed and explained above, may be written out more fully than it has been in the examples hitherto given, and that it is necessary thus to write it out in cases where the divisor is large; and that this is called *Long Division*, being however not a different method from the other, but the same method more fully expressed by figures. The pupils should also understand distinctly that this Long Division, as it is called, is an extremely difficult process, perhaps the most difficult for the learner of all that occur in the whole arithmetical course; and that it will require a great deal of patient attention on their part, and much perseverance, to acquire the art. Let the teacher then take the first of the examples given below, and perform it upon the blackboard, step by step, in a very distinct and deliberate manner. Then let him rub out the work, and say to the class that they may all attempt to perform it upon their slates, but that probably none of them will succeed. They will, however, all be able to do something. The teacher must appear satisfied with their attempts, after examining them cursorily. He is not to criticise them individually, or point out particular errors, but only to observe them so as to know to what points to direct the attention of the class in going over the work a second time. After having thus seen how far the class have succeeded in getting an idea of the process, he directs them to rub out their work, and he then performs the process again, requesting the pupils to pay close attention, as he goes over it step by step. The class can then try again, and this time will succeed better than before. By repeating this process in this manner several times, a large proportion of the class will soon get such an idea of the method that they can perform it in the simple examples which follow, and then a sufficient number, perhaps three or four, may be assigned to them, to be performed at their seats.

72. Divide 36,755 by 2.

WORK UPON THE SLATE.

(72.)

2)36,755(18,377 Quotient.
2
16
16
7
6
15
14
15
14
1 Remainder.

73.	Divide	7,846,213	by	2.
74.	"	326,420,325	"	2.
75.	"	425,326,244	"	3.
76.	"	123,000,325	"	2.
77.	"	100,100,100	"	2.
78.	"	100,100,100	"	3.
79.	"	365,248,924	"	4.
80.	"	565,300,241	"	5.
81.	"	785,365,844	"	4.
82.	"	884,291,244	"	5.
83.	"	100,200,300	"	2.
84.	"	965,367,848	"	7.

85.	Divide	828,394,254	by	6.
86.	"	364,298,194	"	7.
87.	"	291,394,199	"	9.
88.	"	284,111,199	"	9.
89.	"	199,237,563	"	9.
90.	"	244,328,145	"	8.
91.	"	764,289,145	"	3.

If the pupils have become familiar with the [illegible] by means of the practice which the preceding examples have afforded them, they may now proceed to cases where the divisor consists of more than two figures. The teacher must here, as before, perform many examples in their presence, giving them special instruction in respect to the manner in which they are to judge how many times the divisor is contained in the proper number of figures of the dividend, and how to correct their judgment, if it is wrong, by multiplying the divisor by the quotient figure which they assume.

92.	Divide	123,456,789	by	11.
93.	"	"	"	12.
94.	"	"	"	13.
95.	"	"	"	14.
96.	"	"	"	15.
97.	"	"	"	16.
98.	"	"	"	17.
99.	"	"	"	18.
100.	"	"	"	19.
101.	"	"	"	20.
102.	"	345,941,234	"	25.
103.	"	123,246,129	"	234.
104.	"	198,245,148	"	169.
105.	"	302,194,145	"	220.
106.	"	309,145,189	"	184.
107.	"	219,145,189	"	391.
108.	"	314,191,124	"	199.
109.	"	314,191,124	"	201.
110.	"	678,184,191	"	340.
111.	"	246,189,345	"	100.

V. *Dividing by numbers ending with one or more ciphers.*

Let the pupils perform the following examples in full, in the same manner as in the foregoing cases, and let the teacher call their attention to the fact that the quotient always consists of the same figures as the dividend, with as many cut off from the right hand as there are ciphers in the divisor; which figures, so cut off, become the remainder.

112. Divide 365,291,342 by 10.
113. " " " 100.
114. " " " 1000.
115. " 465,491,348 " 10.

Then explain to the class that when they have such cases to perform, all that is necessary is to transcribe the figures of the dividend in a line below, moving each figure one or more places towards the right, according as there are one or more ciphers in the divisor, thus:

116. Divide 106,345,247 by 10.

WORK UPON THE SLATE.

(116.)

10) 106,345,247

10,634,524 and 7 Remainder.

117. Divide 3,424 by 10.
118. " 169,248 " 100.
119. " 1,697,249 " 10.
120. " 2,345,912 " 100.
121. " 200,345,102 " 1000.

Explain now to the pupil that when the divisor consists of any significant figures whatever with ciphers annexed, we cut off from the right hand of the dividend as many figures as there are ciphers in the

divisor, and then divide by the significant figures, removing the figures of the quotient as many places towards the right as there are ciphers in the divisor. The figures cut off must be annexed to the remainder.

122. Divide 109,264,345 by 20.

WORK UPON THE SLATE.

(122.)

20) 109,264,345

5,463,217 and 5 Remainder.

123. 304,102,306 ÷ 30. 125. 109,206,342 ÷ 200.
124. 109,246,328 ÷ 40. 126. 108,346,789 ÷ 300.

The following cases must be performed by Long Division, but in the same manner with the foregoing, in respect to cutting off the figures of the dividend.

127. 369,278,345 ÷ 210.
128. 789,123,102 ÷ 120.
129. 102,793,123 ÷ 420.
130. 347,298,194 ÷ 3200.
131. 368,793,123 ÷ 620.

VI. *General Examples.*

The pupils are to perform the following examples by Long or Short Division, as they may prefer, but in all cases arranging the work neatly upon the slate, and explaining the successive steps, by words appended, in the same manner as heretofore.

132. There was a book of 558 pages which a boy undertook to read in 3 weeks, not including the Sundays. How many pages would he have to read each day?

WORK UPON THE SLATE.

(132.)

6 No. of days in each week.
3 " of weeks.
18 " of days in 3 weeks.

pp.
18)558(31 No. of pages each day.
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133. A sea-captain sailed 36,500 miles in one year. How much was this for each day upon an average, that is, supposing that he sailed the same distance every day?

134. A boy had a long strip of wood, which he concluded to saw up into little blocks, 3 inches long. The strip of wood was five feet long. How many blocks would it make, there being 12 inches in a foot.

135. How many blocks would it have made, if the strip had been 6 feet long?

136. How many would it have made, if the strip had been 8 feet long, and if the boy had sawed off 4 inches for each block?

137. Three boys were on a pond of ice, skating. While there a fourth boy came, named Charles.

While Charles was putting on his skates, they asked him how long he was going to stay. He said his father told him that he might stay a fifth part of four hours. How many minutes would he have to stay, an hour being sixty minutes?

138. A farmer's boy was in possession of eight hens, which yielded him a certain number of eggs daily. At the end of a month he counted them all, and found there were two hundred and forty-eight. On the supposition that all the hens produced an equal number of eggs, how many did each one yield?

139. He bought a peck of corn to feed his hens with, and paid thirty-two cents for it. How much did it cost to feed each hen, on the supposition that all ate an equal quantity?

140. Eventually he sold all the hens for one dollar and ninety-two cents. How much did he receive for each one?

141. A boy bought a Newfoundland dog, and in nine months found that it had increased in weight forty-five pounds. How much did it gain each month?

142. Seven boys went out to sail in a boat, and during the excursion they lost an oar which was worth one dollar and forty-seven cents. How much must each one pay to make good the loss to the owner?

143. They were absent five hours, and during that time they sailed fifteen miles. How far did they proceed each hour?

144. They caught with hooks two hundred and thirty-one fishes, which they divided equally among themselves. How many did each one receive?

145. The owner of the boat said that he would receive the fishes in payment for the oar; and in addition would give the boys fifty-six cents, which he would pay by the loan of his boat; every afternoon's sail being equal to seven cents of the debt. How many times would the boys be entitled to sail in the boat?

146. A little boy went on a journey with his father. He started Monday morning, and returned Saturday night, and during his absence traveled five hundred and seventy miles. How far did he travel upon an average each day?

147. During the journey the father paid forty-eight dollars, as expenses. How much did he pay each day?

GENERAL EXAMPLES.

Let the teacher explain that many of the following examples are very easy to be performed mentally, and that the principal object of attention on the part of the pupil is the arranging and writing the work upon the slate in a correct and workmanlike manner.

1. Multiply the number of days in a week by the number of hours in a day, and it will, of course, give the number of hours in a week. How many will it be?

2. If there are 450 trees in a certain orchard, and each tree contains 2 barrels of apples, and each barrel 240 apples, and each apple 12 seeds, how many seeds will there be in the whole orchard?

Explain to the pupil that the *square* of any number is the product obtained by multiplying that number by itself. Thus 9 is the square of 3, because 3 multiplied by 3 gives the product 9.

3. What is the square of 22?

4. Calculate the square of 256.

5. What is the sum of the squares of 9 and 18?

6. How much greater is the square of 4 than the square of 2?

7. Five boys went a fishing, with leave to remain at the river, where they were going to fish, two hours and a half. How many minutes would they have at the river? There are 60 minutes in an hour.

8. They had but one fishing-pole and line, and they found upon examination that the hook was off. It took ten minutes to put on another, and to get ready for fishing. They agreed to take turns with the pole and line, and to divide the time remaining equally among the five boys. There was a clock upon a steeple near, on which they could see the time. How many minutes should each boy have the pole?

9. If it had been just nine o'clock when they came to the river, what o'clock would it be when the time arrived for the first boy to give up the pole?

10. Some boys went into a church one Saturday afternoon, and they wanted to calculate how many persons could be seated in it. They found that there were one hundred and twenty-eight pews, and they thought that seven persons could sit comfortably in each pew. How many would the house contain?

11. Add together one-half of 5820, one-third of 6933, one-quarter of 14,924, and one-fifth of 600.

12. Four boys went to gather strawberries one summer morning. They agreed that they would divide equally all that they should get. One of them gathered three quarts, another four, another one; and the fourth, who was a small boy, gathered only about a pint, and he unfortunately fell down and spilled them all. How many did each one of the four have, when they were divided?

13. A girl said to her brother that if he would get a kite made, she would pay one-third of the cost of it, for

the pleasure of seeing it go up. The kite cost as follows: 10 cents for the frame and paper, 3 cents for paste to paste it, and 11 cents for string. How much was the girl to pay?

14. Four travelers set out on a journey. They agreed to share the expense of the carriage equally. The hire of the carriage was sixty dollars. It cost fifteen dollars to keep the horses on the way, and in going over a rough place the carriage got broken, and it cost five dollars to get it mended. What was each one's share of the whole expense?

15. What would have been each one's share, if it had cost twenty-one dollars to get the carriage mended?

16. Once a company of three went on a sleighing party; and after they had returned, they wished to see how much the whole had cost, and what was each one's portion. The sleigh cost $6,00, the toll was 25 cents, and the refreshments cost $2,00. What then did the whole cost, and what was each one's portion?

17. A mother once told her boy that she would give him a handsome picture-book if he would amuse his little sister every afternoon for a week; and that the book should be large enough to have five pages for every hour that he should take care of her. He accepted the proposal, and on Monday, Tuesday and Wednesday, he took care of her two hours every afternoon; on Thursday and Friday, two hours and a half; and on Saturday, three hours. How many pages did he earn?

18. Another boy saw a pretty little wagon at a toy-shop, and wanted to buy it. His father said he would lend him the money, which was two dollars and fifty cents, and let him buy the wagon, on condition that he would take the baby out in it to ride every pleasant day, until he had paid for it. His father said he would allow him five cents for every ride, of an hour's length, which he would give the baby with his wagon. How many rides would it take, on these conditions, to pay for the wagon?

19. After the boy had paid for the wagon, he took

the baby out twice more, to pay for a whip which he bought. What did the whip cost?

20. His father continued the practice of allowing him five cents a ride all summer; and after he had bought his whip he went out for nine weeks, four times each week. How much did he earn during those nine weeks?

21. How much did he earn in all with his wagon, including the value of the wagon and whip?

22. Another smaller boy, named George, bought a little wheel-barrow for $1,95, and a spade, a rake and a hoe, for 20 cents each. His father agreed to pay him 3 cents an hour for work in the yard and garden, with his tools, until he had earned money enough to pay for them. How many hours would he have to work?

23. How many days would it take him to do this work, if he was employed five hours each day?

24. If a man earns a dollar a day, and works ten hours, how much does he earn each hour?

25. If a strong and steady boy of fourteen years of age does half as much work as a man, how much would he earn in an hour?

26. If a smaller boy, eight years of age, does one-fifth part as much work as a man, how much would he earn in an hour?

27. It is supposed that the wind moves sometimes, in a gale, at the rate of fifty miles an hour. If it should continue at this rate, how long would it take a cloud to go across the Atlantic, calling the distance four thousand miles?

28. Add together one-fifth of 250, one-sixth of 720, one-eighth of 904, and one-seventh of 49,049.

29. There are five children in a family, whose ages are 16, 14, 9, 5 and 1. What is the average age?

The *average* of several ages is obtained by adding them together, and then dividing by the number of ages.

30. A company of travelers, consisting of seven persons, traveling in a caravan, through a country in the east, found a treasure in three iron chests. The first chest contained 4,329 pieces of money; the second contained 2,124 pieces, and the third contained 71 pieces. How many pieces did each traveler receive, if it was divided equally?

31. A gentleman brought home to his three boys a hammer and some nails, to make little boxes with. They agreed to divide the nails among them equally. They counted the nails, and found there were 342. How many did each boy have?

32. One of the boys proposed that they should call the hammer equal to 150 nails, and include that in the division. What would each one have received, if they had done so?

33. The captain of a company had 861 bullets to divide among his men. There were 129 men in his company, but six of them were musicians, who did not need any bullets. How many bullets did each soldier receive?

34. How many yards are there in 50,022 feet, there being three feet in a yard?

35. How many feet in 12,144 inches, there being twelve inches in every foot?

36. How many weeks are there in 980 days?

37. A boy worked diligently a whole week. On Monday he earned 25 cents; on Tuesday, 17; on Wednesday, 19; on Thursday and Friday, 20 cents

each day; and on Saturday only 4 cents. How much did he earn in all, and what did it average per day?

38. A girl borrowed three books of her aunt to read, and her aunt told her she might keep them a fortnight, but that she must not read them on the Sundays. The first book contained 160 pages, the second 25, and the third only 19. How many pages would she have to read in a day, in order to get through all the books in the fortnight?

39. A gentleman who was going a fishing, employed a boy to dig some worms for him for bait. Said

he, I will make this bargain with you, my boy: I will multiply the number of worms you get by the number of fishes I catch with them, and I will divide the product by ten; then I will pay you as many cents as are expressed by the quotient. The boy agreed to the

bargain. He dug fifty worms. The man, however, was not very fortunate in fishing, and caught only two. How much did he have to pay the boy?

40. There was a boy named Charles, who was six years old. His sister came for him to go to bed at eight o'clock, but he wanted to sit up longer. His father told him that boys of his age ought to have ten hours sleep, and he asked his older brother, who was sitting near, to calculate how many hours there would be between eight o'clock in the evening and six o'clock the next morning, when the bell would ring for them to get up. What should have been the answer?

WORK UPON THE SLATE.

(40.)

12 Midnight.
Subtract 8 Time of going to bed.
4 Hours before midnight.
Add 6 Hours after midnight.
10 Total number of hours.

41. Suppose Charles goes to bed at eight o'clock, how many minutes will he sleep before midnight, there being 60 minutes in an hour?

42. How many hours after midnight, supposing that he awakes at six o'clock?

43. How many minutes in all, from 8 o'clock in the evening to 6 in the morning?

44. A boy was once flying a kite with two hundred yards of string, when the string broke, and the kite, with a part of the string, fell into a river. The boy drew in the rest of the string and measured it. There were a hundred and sixty-seven feet. How much string did he lose, there being three feet in a yard?

45. His twine had cost originally 17 cents, the kite having been given to him. He sold what remained of the twine for six cents, and then bought a new kite and string for twice what he originally gave for his twine. His father gave him at first half a dollar. How much of his half-dollar was left after all these transactions?

46. Some children were sitting around a table eating bread and milk, which their sister was preparing for them. They asked her to divide the milk equally. She said, there are thirty two gills in a gallon of milk. Suppose I had a gallon, how much would there be for each of you? There were four children. How many gills would there have been a-piece, if there had been a gallon to divide?

47. There was a dog at the door. Suppose that the children had given him an equal share with them of the gallon of milk, how many even gills would there have been for each, and how much would have been over?

48. Suppose the sister who gave them the milk was to have her share also, how many gills would there have been for each, including the dog, and how much would have been over?

49. Three farmers' boys in a field were gathering

corn, husking it as they gathered it. They had baskets which they calculated would contain one hundred and fifty ears a-piece. They thought that they could each gather and husk twenty ears in a minute. How many baskets full would they all gather in a day, working ten hours?

50. Suppose that one of the boys should leave off work two hours before the rest, how many baskets would they all gather in the day?

51. These boys had some provisions in a basket, near the fence. If the farmer who employed them had agreed to give them each 75 cents per day for their work, and if the refreshments had cost 15 cents, how much would it cost the farmer for each basket of corn gathered, if the boys worked 10 hours, as supposed in example 49?

52. A general advanced to a river with an army of 5,000 men. There was one boat on the shore, by

which it was found that twenty-five men could be carried over at a time. How many times would this boat have to go over the river to carry across the whole army?

53. Suppose the boat were to cross four times every hour, how many hours would it take to transport the army?

54. If they were to spend ten hours every day in the work, how many days would the army be in passing?

55. If there had been 6 boats, each holding 25 men, and if the army had consisted of 2,100 men, how many times must the 6 boats have crossed, to transport the army?

56. A man brought a drove of cattle to a river, where there was a ferry. The boat would hold about 25 head of cattle at a time. The drove consisted of one hundred and thirty-six. How many full loads would that make, and how many would be left for the last load?

57. The ferryman said he would take the cattle across at the rate of ten cents for every time his boat crossed, or one cent for every two head of cattle. On which plan would the drover get his cattle across the cheapest?

58. The children of two families were calculating their united ages, to see in which family the united ages were the greatest. In one family there were three children, whose ages were 9, 7 and 6, respectively. In the other family there were four children, whose

ages were 8, 6, 4 and 3. In which family were the united ages the greatest?

59. Three years afterwards they made the same calculation again. What was the result in the latter case?

60. Which is the greatest, the sum of 10 and 15, or the sum of 8 and 16?

WORK UPON THE SLATE.

(60.)

10	8
15	16
25 Sum.	24 Sum.

Ans. The first sum is the greatest.

61. Which is the greatest, the sum of 50 and 60, or the product of 40 and 3?

62. What is the sum of 1936 and 2054?

63. What is the product of 1829 and 25?

64. What is the difference between 982 and 3 times 256?

65. What is the difference between 91 times 72, and 92 times 71?

66. What is the difference between the product of 810 and 56, and the product of 99 and 81?

Explain to the pupils that in the following examples they are to perform the operations indicated by the signs used, reminding them first

of the meanings of the various signs, as they have been heretofore explained, viz: the sign + for addition, — for subtraction, × for multiplication, and ÷ for division.

67. 36,912 + 41,384.
68. 35,209 + 24,184 + 91 + 8,142.
69. 345,268,291 × 7.
70. 101,245,201 × 3.
71. 35,600,004 × 23.
72. 101,201,345 ÷ 16.
73. 34 + 45 + 67 + 1825.
74. 360 + 450 — 218.
75. 1,800 + 1,800 + 1,800.
76. 1,800 × 3.
77. 3,600 × 32.
78. 156 × 325.
79. 11,199 ÷ 3.
80. 99,801 ÷ 9.
81. 4,064 — 1,002.

Explain to the pupils that when two quantities are connected, thus, 2 + 3, or thus, (2 — 3), they are to be added or subtracted first, according to the sign between them, and then that the operation indicated by the signs which come after is to be performed upon the sum or difference so obtained. Thus, in the case of (2 + 4) × 3, the 2 and the 4 are to be added first, and the sum thus obtained, viz: 6, is to be multiplied by 3, which will give 18 as the value of the whole expression.

82. (31 + 22) × 4.
83. (220 + 213) × 5.
84. (660 — 114) × 23.
85. (111 + 22) × 3.
86. (66 + 42) × 51.

It is the same if the quantities which are bound together are followed by the sign for division, only then what is obtained by combining the numbers is to be divided. Thus, in the case of (3 + 9) ÷ 2, we first add 3 and 9, which make 12, and then divide the 12 by 2, which gives 6 for the answer.

87. $(66 + 42) \div 2$.
88. $(345 + 981) + 24$.
89. $(256 - 39) \div 111$.
90. $(357 - 256) \times 5$.
91. $(456 - 32) \times 112$.
92. $(321 - 36) \times 197$.

The bond which connects the numbers together in this way is called a *vinculum*. It is of no consequence which way it is made, whether thus, $(2 \times 4,)$ or thus, $\overline{2 \times 4}$.

93. $(77 + 208) \div 6$.
94. $\overline{291 - 11} \div 7$.
95. $(37,891 + 3) \times 16$.
96. $(115 + 21) \times 42$.
97. $(342 - 3) \times 16$.

Sometimes two sets of quantities are connected by a vinculum, and the value of each set is to be calculated separately, and then the results added together, or otherwise, according to the sign. Thus, in the case, $(4 + 8) \times (2 + 5)$, the pupil must first add the 4 and 8, which make 12, and then add the 2 and 5, which make 7. Then multiplying the 12 by 7, we get 84, which is the value of the whole expression.

98. $(3 + 4) \times (8 + 9)$.
99. $(30 \div 5) \times (2 - 1)$.
100. $(202 + 3) \times (80 + 25)$.
101. $(303 + 4) - (24 - 16)$.
102. $(300 + 2) \times (200 - 3)$.
103. $(800 + 2 + 5) \times 2$.
104. $(800 \times 6) + (300 \times 19)$.
105. $(500 \times 2) + (200 \times 5)$.
106. $(101 + 101) + 100$.
107. $(25 \times 4) + (25 \times 4)$.
108. $(108 \div 6) + (3 \times 5)$.
109. $1,089 + 3,679 - 45$.
110. $1,000 + 1,000 - 500$.
111. $36 + 24 + 360 + 9,284$.

112. A large mountain of ice was floating at sea in a current. The current carried the ice towards the southward, 56 miles in one hour. The next day there

came a southerly wind, which blew the iceberg towards the north, 32 miles. The third day it drifted to the south again, 22 miles. At the end of the third day, how far was it to the southward of the place it started from?

113. A merchant had a ship which he sent on several voyages. The first voyage the ship made a profit of $5,000; the second voyage she lost $300; the third voyage she lost $1,500; the fourth voyage was much more prosperous than the first, the ship having made $15,000. What was the balance of the loss and gain?

WORK UPON THE SLATE.

(113.)

Losses.		*Gains.*	
2d voyage,	*300*	*1st voyage,*	*5,000*
*3d " *	*1,500*	*4th " *	*15,000*
Total losses,	*1,800*	*Total gains,*	*20,000*
		Deduct losses,	*1,800*
		Balance of gain,	*18,200*

114. A newspaper boy, selling newspapers in Nassau street, New York city, began at 3 o'clock in the afternoon, with a number of papers, and no money. He had spent all his money in buying papers. He sold papers an hour, and received from his sales 27 cents. He then dropped a ten-cent piece in making change, which rolled off so that he could not find it. Wanting to recover this loss, he went to playing marbles with some other boys; but instead of gaining, he

lost 7 more. Then he went back to selling papers, and sold enough in an hour to come to 19 cents; and finally, a gentleman who wanted to go in at a book-store a few minutes, gave him six cents for holding his horse. What was the balance of his losses and gains?

115. A boy had a fishing apparatus which another boy wanted to buy. The owner said he would sell it for five cents more than it cost him. And how much did it cost you? asked the other. I gave 1 cent for the hook, 2 cents for the sinker, 12 for the line, and 20 for the pole, replied the owner. There was also a box for bait which cost 10 cents, but that was not included in the trade. What would be the price which the purchaser would have to pay to buy the pole and line?

116. Three boys went a fishing. One caught 16 fishes, another 6, the third 14. When they got home they divided the fishes among themselves equally. How many did each boy have?

117. William, Henry and James went up into the woods to cut some poles for fishing-rods. They agreed to divide the poles equally, excepting that if there were any left after the division, they should be given to Henry, because he was to carry the axe. William cut 16 poles, and Henry 8; but James got hurt in clambering over a log before he had finished cutting the first one. How many poles did each boy receive?

118. One day a gentleman found his three boys disputing about the division of some marbles which he had brought home to them. How many have you

got? asked he. Fifty, said one of the boys. Well, said he, here is one more; now you can divide them equally. And without any more quarreling, the boys took the marbles and divided them, and went away. How many marbles did each boy have?

119. A boy and his sister, sitting down upon the bank of a river, saw a squirrel climbing up the trunk of a tree. He was going into his hole. He had 1,512 nuts in his hole. How many would he have for each day while the ground was covered with snow, supposing the snow to remain on the ground that year 72 days?

120. How many would he have for each day, supposing the snow to remain on the ground 63 days?

121. Suppose the boy had taken all these nuts and carried them home, and divided them among his 3 brothers, without taking any himself; how many would there have been for each?

122. Four boys went into the woods to gather nuts. One of them was a large boy, and the other three were small. They agreed that the large boy should have one-quarter of all the nuts they should get, in consideration of his going with the other boys, and showing them the way. He was also to have an equal share of the other three-quarters with the other boys, in consideration of his helping to gather them. If they gathered one bushel of nuts, what would be each one's share, supposing that there were 3,600 nuts in a bushel?

123. If they gathered three bushels, what would be each one's share?

124. If they gathered 5,600 nuts, what would be each one's share?

125. If, after the above agreement was made, one of the small boys concluded not to go, how much would be each one's share, if they gathered one bushel of nuts, and gave the older boy one quarter as before?

126. How much, if they gathered 3 bushels?

127. How much, if they gathered 5,600 nuts?

128. How long would a bushel of nuts last four boys, supposing they ate 20 nuts a-piece every day, and supposing also that there were 3,600 nuts in a bushel?

129. A boy once wanted to calculate how many cents it would take to make a pile as high as the room. He asked his father to measure the height of the room, which his father did, and found it 9 feet. He then made a little pile of cents one inch high, and found that it contained 11 cents. There are 12 inches in a foot. How many cents would it take, and how much would they be worth in dollars?

130. A gentleman took a journey with his wife and three daughters. Their expenses were as follows: For hack-hire they paid 50 cents each; for passage in the steamboat $4,50 each; for passage in the rail-cars $5,00 each; for expenses at inns $4,00 each. What did the whole journey cost, and what was the expense of each individual?

131. A little girl purchased a pair of rabbits for 50 cents, a pair of doves for 75 cents, a canary bird for

$2,00, a lap-dog for $3,00, a Maltese kitten for 55 cents. What did all the animals cost?

132. Her sister wished to pay for one-half. How much did her sister pay?

133. A young lady is fifteen years old. How many days old is she. There being 365 days in a year?

134. How many weeks old is she, considering 52 weeks in a year?

135. Twenty young ladies formed a pic-nic party. They purchased 10 pounds of cake, at 12 cents a pound; 20 lemons, for 20 cents; 3 pounds of sugar, at 8 cents a pound; 24 oranges, at 3 cents each; and 5 pounds of candy, at 10 cents a pound. They also gave a boy 6 cents to carry these things to the ground. What did all cost? What would be the share of each member of the party?

WORK UPON THE SLATE.

(135.)

10 lbs. cake at 12 cents,		1,20
20 lemons at	1 "	20
3 lbs. sugar at	8 "	24
24 oranges at	3 "	72
5 lbs. candy at	10 "	50
For the boy,		6
Total cost,		2,92

2,0 | 29,2

14—12 cents, share of each.

136. Thirty young ladies, from a school in New York, went on an excursion to the Brooklyn Navy Yard. They rode down Broadway in an omnibus, for which they paid 6 cents each; they crossed East river by the Fulton ferry, for which they paid 2 cents each; for refreshments, in Brooklyn, they paid 5 cents each; their return passage in the ferry was also 2 cents each; and their ride up-town, in the Broadway omnibus, 6 cents each. What was the whole expense of the excursion? What proportion should each one pay?

137. A lady purchased 10 yards of calico, for 16 cents a yard; 15 yards of ribbon, for 8 cents a yard; 44 yards of silk-braid, for 22 cents a yard; 24 skeins of silk, for 5 cents a skein; 15 pieces of tape, for 9 cents a piece; and 8 yards of silk, for 98 cents a yard. What was the amount of the whole purchase?

138. A gentleman took his four children up to the top of a high hill, to look at the prospect. They looked towards their home, and could see the house where they lived, at a great distance down in the valley. The boys wished to know how far it was, and their father said that it was about 60 rods from their house to the bridge, and 2 miles, which is 640 rods, to the foot of the hill which they had ascended, and about 120 rods up the hill. What was the whole distance in rods?

139. What was the whole distance in miles, 320 rods being a mile?

140. The gentleman had paid 75 cents for a horse and wagon, 14 cents toll upon the bridge, and 6 cents to a boy to hold their horse at the foot of the hill.

How much had the whole expedition thus far cost each of them?

141. How much would it have cost them in all when they should get home, including the toll on their return?

142. The toll for a carriage on that bridge would have been 18 cents. How much would the whole expedition have cost them, if they had come in a carriage?

143. A gentleman once went out with his children upon a pleasure party. They were going twelve miles in a carriage, then four miles in a boat on a little river, and lastly were to walk two miles to a farmer's house, where they expected to get some strawberries and cream. How long would the whole expedition be, both going and returning?

144. When they were on the water, the boy counted four persons in the boat, the two horses, and the man by the carriage on the shore, and a flock of ducks and geese, containing five, on the water. How many living things were there in sight?

145. If the use of the boat cost 25 cents, and if they paid 50 cents for the man to row them, how much would the passage on the water cost them?

146. How much, if the boat had cost 31 cents, and the man 63?

147. A gentleman gave his son $2,36 to purchase some articles at a store. He was to buy 2 gallons of

molasses, at 42 cents per gallon; 3 pounds of beef, at 12 cents a pound; and half a bushel of wheat, at 98 cents a bushel. How much money should he receive in change?

148. The grocer gave him the proper change; but when the boy took his purse from his pocket at home, intending to give it to his father, he found that he had only 35 cents. How much money had he lost?

149. To cultivate in the boy the habit of carefulness, his father told him that he should withhold his weekly allowance of pocket-money, until it equaled in amount the sum lost. The father withheld the spending-money of four weeks. What was the boy's weekly allowance?

150. A little boy asked his father for a martin-house, which was promised to him, on condition that he would calculate exactly what it would cost. Accordingly, the boy first went to the carpenter and inquired of him respecting it. The carpenter told him that it would require eleven feet of board, which was worth eight cents per foot, three pounds of nails, which were worth six cents per pound, and that it would employ him seven hours to make it, for which he should charge at the rate of twelve cents per hour. The painter said he should charge thirty-nine cents for painting it. The boy calculated the expense accurately, and reported it to his father, who gave him the martin-house. What was the amount?

151. In paying the men for their work, the boy went first to the carpenter, and gave him a three-dollar bill. How much did he receive in change?

152. He then went, and from the money which he received of the carpenter paid the painter. How much change did the boy return to his father?

153. The boy paid a man forty-three cents for erecting it on a tall and stout pole in the yard. What was the whole expense of the martin-house?

154. A gardener told his son that he would allow him to cultivate a portion of his ground, to sell the articles that he raised, and to appropriate all the proceeds to his own use, excepting so much as should be necessary to repay what he should expend for seeds. The gardener furnished the boy with seeds, as follows: Two papers of beet seed, at four cents each; one paper of onion seed, at six cents; one paper each of carrot, turnip, cabbage and lettuce seed, at five cents per paper; some water-melon seeds for ten cents; some musk-melon seeds for fifteen cents; six quarts of corn, at four cents per quart; and two bushels of potatoes, at forty-eight cents per bushel. How much did it all amount to?

155. At the end of the season he sold all his beets for eighty-three cents; two bushels of onions, at eighteen cents per bushel; one bushel of carrots for twenty-four cents; two pecks of turnips, at ten cents per peck; fourteen cabbage-heads, at three cents per head; six bunches of lettuce, at two cents per bunch; nine water-melons, at five cents a-piece; seven musk-melons, at seven cents a-piece: besides thirty-one ears of green corn, at four cents per ear, and eighteen bushels of potatoes, at forty-two cents per bushel. How much did he realize, in all, from the sale of his produce deducting the expense of the seed?

156. His three brothers agreed to assist him in cultivating the ground, on condition that he would divide the profits equally among them all. How much was there to divide among the boys, and what did each boy receive?

157. If each one had bought with his portion of the profits a pair of skates for forty-seven cents, and a sled for thirty-two cents, how much money would he still have left?

158. If he should wish to spend the remainder in making presents of equal value to six of his friends, what would he pay for each present?

159. A gentleman told his son that for every page of his writing-book that was written without mistake or blot, he should receive five cents. On finishing the book the boy received thirty-five cents. How many pages were well written?

160. If he had executed every page well, he would have received one dollar and sixty cents. How many pages were there in the book?

161. If the book had contained six leaves less than it did, how many pages would there have been?

162. In a school containing one hundred and twenty scholars, the teacher wished to calculate how many pens would be required for a quarter. The quarter was to be twelve weeks long, and each scholar was accustomed to have two pens a week. How many gross of pens would be required, there being one hundred and forty-four pens in a gross?

163. What would be the cost of these pens, at 75 cents a gross?

164. On a certain steeple there is a clock, which strikes the hours regularly from one to twelve. How many blows does the hammer strike upon the bell in a day?

165. How many blows does it strike in a week?

166. How many blows does it strike in a year?

167. A little after eight o'clock one evening, John said to James, if you will write me a letter containing as many lines as there have been strokes struck by the hammer of the clock since noon to-day, I will write you an answer containing as many lines as there will be strokes struck till after midnight. Which would contain most lines, the letter or the answer?

168. Some philosophers once measured one of the pyramids of Egypt, and found the length of one of the sides about 600 feet. How great would that make the distance round the pyramid, supposing all the four sides to be equal?

169. Is that distance more or less than half a mile; a mile being 5280 feet? and how much more or less is it?

170. How many steps would a boy take in going round such a pyramid, supposing [illegible] of his steps to be two feet long?

171. How many minutes would it take him to walk round it, supposing him to walk at the rate of one pace in a second?

172. If the height of the pyramid was the same with the length of one side of the base, how many inches would it be necessary to ascend in getting to the top?

173. How many steps would be required in a stair to reach the top, if each step was eight inches high?

174. How long would it take a boy to ascend this height, supposing him to take one step in two seconds, and to stop twice to rest, and for five minutes each time?

175. It is about three times as far round the stem of a tree as it is across it, through the wood. Some boys finding an oak tree in a forest, wished to know how wide a board it would make. They measured it, and found it exactly two feet round. How wide would a board be made from this tree, there being twelve inches in a foot?

176. A gentleman seeing a very wide mahogany board in a lumber-yard, wished to know how large the tree must have been, from which it had been cut. He measured the board, and found it three feet and four inches wide. How large did this prove the tree to have been in circumference?

177. A boy once measured the shadow of a post late in the afternoon, and found it 12 feet long. He then measured the post itself, and found it 4 feet high. Thus he ascertained that the post was one-third the length of its shadow. He then asked his father whether all objects were one-third as tall as their shadows. His father said this proportion would prove true in

him what the cost would be. For a geography and atlas he was to pay one dollar and fifty cents, for a grammar thirty-seven cents, for an ancient history one dollar and twelve cents, for a slate and pencils twenty-two cents, for a reading-book sixty-two cents, and for a writing-book nine cents. What would be the whole cost of sending him to school for a quarter, supposing the price of tuition to be eight dollars, and considering the books to be worth, at the end of the quarter, half what they had cost?

190. A ship at sea sailed the first day seventy miles, the second day one hundred miles, the third day one hundred and twenty miles, and the fourth day, owing to the lightness of the wind, only ten miles. What was her average rate of sailing?

191. On a canal at the South there were 88 men and 26 boys at work. Each of the men were paid $1,37 a day, and the boys received 62 cents each. How much was the whole expense per day of carrying on the work?

192. A gentleman in furnishing a school-room paid 96 cents a yard for 64 yards of carpeting, $1,25 each for 58 desks, 75 cents a-piece for 26 chairs, $4,25 a-piece for 6 settees, and $40,58 a-piece for two secretaries. How much did all the furniture amount to?

193. If a ship sails at an average rate of 8 miles an hour, how many miles will she sail in a day?

194. How many miles will she sail in three months, allowing 31 days to the month?

195. If she sailed but 6 miles an hour, how many miles would she sail in 5 months?

196. If there were 6 panes of glass in each of 5 windows in a house, and twice as many panes in each of 11 more windows, how many panes would there be in the whole house?

197. If a gentleman travels 37 miles one day by stage, three times as far the next day by steamboat, and five times as far in the cars the succeeding day, how many miles does he travel in all?

198. In a school there are 18 pupils. The 6 youngest study 2 lessons a day, 8 of the older ones study 4 lessons each day, and the 4 eldest study 4 lessons every day, and 1 additional lesson every other day. How many lessons will the teacher have to hear recited in the course of a week, supposing the school to be kept 6 days?

199. In another school there are 96 scholars. Each scholar uses 20 slate pencils, 8 lead pencils and 4 pieces of India rubber in the course of the year. The slate pencils were bought at the rate of ten for a cent, the lead pencils cost three cents a-piece, and the India rubber one cent for each piece. How much would it cost each scholar to provide these for himself for one year?

200. How much would it cost the teacher to provide these articles for all the scholars?

201. A pedler went round selling various articles. The first day he took for what he sold thirty-six cents;

all cases, if the objects were upright, and if the shadows were measured immediately before the descent of the sun should make them longer. The boy then went and measured the length of the shadow of a steeple, near his father's house, and found it two hundred and fifty-five feet. How high was the steeple?

178. He then measured the shadow of a tree, and found it 81 feet. How high was the tree?

179. The next morning about ten o'clock, he measured the shadow of the post again, and found it 8 feet long; and then measured that of a tall martin-pole, which proved to be 56 feet long. How tall was the martin-pole?

180. A gentleman wanted to put a lightning-rod upon his house. It was to extend 5 feet above the top of the chimney. The chimney itself was 7 feet high, and from the foot of the chimney, along the slope of the roof, to the eaves, it was 25 feet. The house was 26 feet high, from the ground to the eaves, and the rod was to penetrate 6 feet into the earth. How many feet long would it be in all?

181. How long would this rod be, in yards?

182. A farmer had a field which he wanted to make a new fence for. It was oblong in form, being 720 feet long, and 180 feet wide. He thought he would have the posts of the fence 9 feet apart. How many posts would it take to go round the field?

183. He thought that he would have his fence 3 boards in height, and that he would use boards aver-

aging 1 foot wide. How many feet of boards would it take for each length of fence between the posts?

184. How many would it take for the whole fence?

185. Among the Alps there are long and deep ravines filled with solid ice. These masses of ice are called glaciers; and though they are apparently fixed and solid, yet it is found, on close examination, that the ice composing them is moving slowly all the time down the ravines towards the valleys below. Suppose this ice moves at the rate of 1 foot in 24 hours, how many years will it take to move a mile? A mile contains 5280 feet.

186. A stream of lava from a volcano moves very slowly after it has got nearly cold, sometimes about three feet in an hour. At this rate, how far would it go in a day?

187. How long would it take such a stream of lava to advance a mile?

188. A gentleman went to a cabinet-maker's, and purchased the following articles, viz: one mahogany bureau, which cost twenty dollars, two tables that were ten dollars a-piece, a rocking-chair for which he paid eight dollars, and a centre-table, the price of which was thirty dollars and fifty cents. He left a hundred-dollar bill with the cabinet-maker, requesting that the change might be sent to him with the articles. How much change should he have received?

189. Charles, being desirous to go to school, was told by his father that he might go, if he would tell

thirty-three miles; the third, thirty-five miles; but owing to their fatigue on the fourth day, they were only able to travel twenty-eight miles. How many miles a day did they travel, on an average?

215. A gentleman who had been making some repairs upon his house, asked his son to calculate the amount of the money which he had paid. For re-setting grates he had paid twelve dollars, for mending locks two dollars and fifty cents, for making fire-boards two dollars and seventy-five cents, and for various other things twenty-five dollars. What was the whole amount?

216. A girl who was in the habit of purchasing candy frequently at a confectioner's, concluded, one day, to make a calculation what it probably cost her for the year. She estimated that the amount would average six cents twice a week. How much would this amount to in a year, there being fifty-two weeks in a year?

217. What would be the whole amount for ten years, supposing her to continue the practice during all that time?

218. A gentleman had accumulated in the course of years a considerable library, and he asked his two children, James and Lucy, to calculate what had been the whole probable cost. He told them he thought the books would average two dollars a-piece. The children counted the number of books on one of the shelves which seemed to contain about a fair average, and found 28 volumes. There were six shelves in that division, and ten such divisions around the room. How much then was the probable cost of the whole?

219. A boy saw a large book at a cheap book store, which the owner offered to sell for $4,80. The book-seller had also some little prints which he sold for 25 cents a sheet, there being five pictures on a sheet. The book was full of pictures also; there being one on every other page, and 320 pages in the book. Were the pictures in the book or those on the sheet the cheapest? What would the former cost a-piece, supposing the boy were to cut the book to pieces to get the pictures?

220. How much would the pictures on the sheets cost a-piece?

221. How much would it cost to fill a scrap-book with pictures from the sheets, supposing there were 200 pages in the scrap-book, and 4 pictures were put upon each page, with one large one, costing 10 cents, at the beginning, for a frontispiece?

222. A boy had a string which he wound upon a round stick. The stick was two inches in circumference, and the string went round it ten times. How long was the string in inches?

223. There are in this book 126 problems in Addition, 176 in Addition of Columns, 152 in Subtraction, 150 in Multiplication, 147 in Division, and 224 under the head of General Examples. How many are there in the whole book?

224. If a class of pupils perform 10 of these examples every day for 5 days a week, how long will it take them to perform all which the book contains?

the second day he received twice as much; the third day he sold nothing, but the fourth day he received five times as much as he did the second day. How much did he receive in all?

202. There were four brothers who owned an orchard containing 192 fruit trees, each brother owning a certain portion of the trees. The trees belonging to the eldest brother produced 144 barrels of fruit, which he sold for $1,75 a barrel. The next brother had 110 barrels from his trees, and sold them for $1,87 a barrel. The third brother had 86 barrels of fruit, and sold them at $1,62 per barrel. The trees belonging to the youngest brother were small, and produced only 53 barrels, but the fruit being very fine, he sold them for $1,96 a barrel. If each brother had owned an equal share in the orchard, what would have been the amount of money which each one would have received?

203. A gentleman owned four houses. For the rent of one he received $75,00 per quarter, for another $150,00, for a third $225,00, and for the largest one $250,00. If he had been able to rent them but half the year, what would he have received from them all?

204. A party of eighteen boys went out one afternoon in search of strawberries. Each of them gathered four quarts, and sold them for 6 cents a quart. How many quarts did they gather, and what did they receive for them all?

205. If an omnibus in Broadway makes twenty trips up, and the same number down, in a day, and each

time carries twelve passengers, paying six cents each, how much money would the driver receive in the course of the day?

206. How much would he receive in a week, not including Sunday?

207. How much would he receive in a year?

208. If the driver has one-fourth of the money that the passengers pay, and the owner of the omnibus the remaining three-fourths, how much would each receive in a year?

209. If a young lady should ride to and from school every day, and pay six cents for each time, how much would it cost her a week, supposing that she goes to school five days each week?

210. How much would it cost her for a quarter, supposing the quarter to consist of eleven weeks?

211. How much would be the whole amount for a year, if there were four quarters in a ye

212. How much would it cost for six years?

213. Some robbers broke into a house, and stole a gold watch which was worth one hundred and fifty dollars, a gold chain the value of which was thirty-five dollars, two rings, one worth three dollars and the other worth ten dollars, and a key which was worth five dollars. What was the value of all the articles?

214. Two Indians started on a hunting expedition, and the first day they traveled thirty miles; the second,

ANSWERS.

ADDITION.

No.	Answers.	No.	Answers.	No.	Answers.	No.	Answers.
1	94	37	$2 14	65	120	100	No, sir. 71
2	$1.55	38	87	66	57	101	832
3	$9 92	39	$2 24	67	216	102	121
4	$1 47	40	113	68	979	103	$52 75
5	$2 16	41	494	69	420	104	2290
6	61	42	271	70	67	105	$35 00
7	88	43	223	71	21	106	1175
8	83	44	40	72	$9 00	107	80
9	$2 80	45	378	73	34	108	$10 12
10	$4 30	46	392	74	$4 00	109	84
11	162	47	$265	75	23	"	$1 49
12	47	48	$185	76	.4800	110	33
13	1460	49	387	77	54	111	116
14	168	50	$3 02	78	240	"	520
15	1008	51	$3 14	79	$12 00	112	316
16	$7575	52	18	80	$14 00	113	365
17	364	"	35	"	$26 00	114	76
18	75	"	44	81	410	115	39
19	47	"	$2 79	82	74	"	24
20	$1 48	"	25	83	$4 25	116	38
21	330	"	46	84	70	117	$2 27
22	342	53	940	85	$2 60	"	$1 24
23	176	"	5	86	$1 34	118	$3 26
"	518	54	28	87	$2 19	119	$84 44
"	450	"	55	88	89	120	$0 56
24	320	55	12	89	$6 50	121	$1 72
25	$460	"	148	90	$4 25	122	6
26	610	56	$0 60	"	$130 00	"	4
27	$269	"	$1 73	91	$20 89	"	10
28	$1 70	"	$2 33	92	$285 00	"	1725
29	$2 95	57	$1 25	93	2540	"	1380
30	54	58	$34 00	94	1650	"	3105
31	$3 49	59	$4 15	95	4190	123	549
32	$2 26	60	$1 27	96	$269	124	2316
33	$2 57	61	143	97	$12 00	125	326
34	$1 30	62	131	98	591	126	2486
35	$4 22	63	$9 99	99	400	"	$3,256 00
36	49	64	597				

ADDITION OF COLUMNS.

No.	Answers.	No.	Answers.	No.	Answers.	No.	Answers.
1	500,000	45	643,210	89	6,840,466	133	853,735
2	500,000	46	698,760	90	7,044,666	134	946,235
3	508,910	47	688,677	91	6,604,834	135	964,213
4	511,220	48	643,018	92	6,646,684	136	772,053
5	500,000	49	714,525	93	8,686,060	137	826,659
6	564,730	50	843,818	94	8,686,880	138	826,659
7	512,340	51	838,739	95	8,622,680	139	921,765
8	599,990	52	883,217	96	8,664,682	140	877,769
9	5,590,500	53	798,767	97	8,533,192	141	922,565
10	5,090,000	54	763,917	98	8,659,458	142	970,901
11	5,595,090	55	797,765	99	7,737,386	143	991,103
12	5,109,090	56	897,212	100	7,877,198	144	991,081
13	5,000,200	57	798,765	101	9,115,156	145	72,995
14	4,080,050	58	843,211	102	8,722,800	146	69,955
15	4,808,500	59	810,381	103	8,356,440	147	83,176
16	5,505,800	60	843,216	104	9,111,876	148	71,538
17	8,008,002	61	4,882,642	105	8,721,602	149	104,965
18	7,212,208	62	5,040,844	106	8,822,014	150	109,052
19	8,000,009	63	4,802,684	107	8,757,802	151	83,511
20	8,080,001	64	5,886,086	108	8,394,140	152	100,719
21	8,005,182	65	6,002,036	109	4,344,440	153	103,098
22	7,000,821	66	6,048,682	110	4,840,842	154	87,405
23	8,008,102	67	5,628,084	111	4,078,082	155	79,828
24	4,590,000	68	6,884,246	112	6,892,512	156	94,590
25	7,705,700	69	5,327,262	113	7,519,256	157	247
26	6,900,901	70	6,340,586	114	7,592,952	158	88
27	7,995,002	71	5,273,328	115	5,933,994	159	101
28	8,008,005	72	4,733,868	116	5,337,060	160	77
29	7,888,978	73	4,175,752	117	6,659,946	161	88
30	7,618,852	74	4,067,734	118	5,672,438	162	175
31	7,813,783	75	4,107,514	119	5,350,092	163	146
32	6,062,000	76	3,574,156	120	5,147,992	164	92
33	6,000,640	77	6,860,862	121	701,293	165	206
34	8,004,501	78	7,288,284	122	580,015	166	183
35	8,004,006	79	7,266,286	123	600,063	167	204
36	8,000,006	80	7,448,704	124	672,971	168	162
37	7,999,824	81	7,102,220	125	873,321	169	356
38	8,000,402	82	6,262,656	126	833,325	170	289
39	8,000,006	83	6,600,696	127	620,763	171	244
40	8,052,205	84	7,937,992	128	633,031	172	170
41	7,590,530	85	6,004,314	129	533,691	173	182
42	7,910,490	86	5,559,994	130	593,437	174	155
43	7,377,000	87	4,796,438	131	716,287	175	171
44	7,439,420	88	6,003,994	132	741,439	176	173

SUBTRACTION.

No.	Answers.	No.	Answers.	No.	Answers.	No.	Answers.
1	876,435,201	43	24,638	86	92	124	$294
2	756,324,110	44	9,655	87	$2 79	125	17
3	406,231,021	45	2,897,899	88	$94 25	126	8
4	102,354,310	46	1,000	89	9	127	40
5	410,221,103	47	127,698	90	313	128	100
6	103,231,013	48	351,725	91	57	129	71
7	211,212,021	49	19,002	92	176	130	7
8	130,133,410	50	66,151	93	169	"	$216 00
9	342,221,120	51	300,000	94	$0 89	"	$159 00
10	123,012,010	52	104,021	95	79	131	$4 49
11	1,234,501,234	53	3,005,829	96	$1 63	"	20
12	345,670,123,456	54	109,401	97	68	132	$9,875
13	12,345,678,012	55	316,614	98	39	"	$12,175
14	19	56	756,381	99	362	133	$1,975
15	94	57	208,891	100	79	134	115
16	85	58	315,549	101	96	135	65
17	278	59	199,199	102	89	136	35
18	199	60	48,747	103	145	137	10
19	273	61	499,744	104	52	138	61
20	181	62	283,113	"	$2 28	139	11
21	182	63	559,225	105	48	140	220
22	11	64	101	106	84	141	88
23	353	65	262,103	"	9	"	61
24	24	66	78	107	91	"	71
25	23	67	19	"	59	142	2280
26	21	68	73	108	$2 89	"	720
27	22	69	20	109	$1 24	"	1920
28	11,500	70	53	110	$2 61	"	1080
29	9,070	71	102	111	$2 26	143	101
30	2,430	72	181	112	53	144	58
31	4	73	$2,926 00	113	$1 66	145	460
32	8	74	1	"	$1 13	146	400
33	31	75	23	114	11	"	285
34	213	76	26	"	9	"	115
35	64	77	18	115	46	147	293
"	37	78	92	116	88	"	232
36	110,703	79	517	117	79	"	66
37	214,456	80	67	118	144	148	170
38	11,000	81	$1 44	119	130	"	29
39	88,889	82	$4 13	120	25	149	1900
40	1	83	$13 96	121	378	150	2900
41	383,063	84	54	122	330	151	2800
42	204,904	85	$7 77	123	$22	152	25

MULTIPLICATION.

No.	Answers.	No.	Answers.	No.	Answers.
1	$1 00	51	542,715,296	101	3,600
2	975	52	258,594,938	102	5,040
3	9344	53	89,769,584	103	9,060
4	12,500	54	169,894,312	104	67,880
5	48	55	434,573,424	105	972
6	48	56	429,063,128	106	11,664
7	76,810	57	277,777,775	107	720
8	5,940	58	164,197,523	108	30,000
"	9,660	59	383,125,015	109	92,950
9	93,600	60	567,864,829	110	111,540
10	48	61	200,300,367	111	15,000
11	90	62	247,520	112	7,300
12	216,000	63	318,240	113	6,260
13	$3 95	64	2,004	114	84,042
14	1,306,095,723	65	12,024	115	107,617
15	2,160,566,770	66	6,012	116	511,598
16	3,368,592,918	67	334	117	11,299,554
17	842,692,322	68	$22 75	118	127,865,776
18	1,999,035,639	69	2,835	119	37,003,168
19	2,777,777,775	70	2,817	120	887,088,782
20	3,333,333,330	71	652	121	97,100,982
21	2,181,997,998	72	7,824	122	4,658,544
22	1,321,212,120	73	17,343,693,375	123	2,820,843
23	2,525,252,525	74	14,792,494,268	124	7,935,065
24	1,092,789,636	75	7,443,728,426	125	989,620,290
25	922,002,226	76	10,101,010,095	126	2,580,903,741
26	264,565,423	77	69,135,802,470	127	7,200
27	1,806,326,620	78	69,999,999,993	128	43,200
28	1,312,642,242	79	62,222,222,216	129	172,800
29	1,692,963,339	80	54,444,444,439	130	1,209,600
30	3,630,363,096	81	46,666,666,662	131	4,838,400
31	1,270,102,222	82	38,888,888,885	132	58,060,800
32	1,819,069,986	83	30,000,000,008	133	3,900
33	$10 00	84	23,333,333,331	134	3,250
34	112	85	15,555,555,554	135	9,750
35	12,285	86	7,777,777,777	136	224,250
36	9,555	87	81,818,172,720	137	37,001,250
37	10,080	88	8,641,975,230	138	$32 24
38	40,320	89	9,876,543,120	139	$55 90
39	630	90	11,111,111,010	140	$58 24
40	4,410	91	34,523,671,230	141	9,483
41	39,690	92	12,476,353,010	142	1,092
42	2,048	93	41,614,190,544	143	56,784
43	106,971,080	94	62,468,013,432	144	5,678,400
44	257,237,432	95	54,339,865,608	145	644
45	638,820,882	96	16,469,685,284	146	1,127
46	241,975,237	97	13,564,093,596	147	276
47	101,015,535	98	26,956,231,170	148	$17 01
48	333,333,330	99	21,287,769,408	149	$12 00
49	691,358,024	100	10,859,564,736	150	1,200
50	325,927,404				

DIVISION.

No.	Answers.		No.	Answers.		No.	Answers.	
	Quot.	R.		Quot.	R		Quot.	R.
1	123		49	16,666,666	4	70	44,979,242	4
2	23		50	11,111,111	1	71	172,609,550	
3	22		51	109,739,369		"	115,073,033	1
4	12		52	219,345,232		"	86,304,775	
5	1220		53	42,912,864	1	"	69,043,820	
6	2430		54	113,075,369	5	72	18,377	1
7	1220		55	45,723,651	2	73	3,923,106	1
8	11		56	222,166,611		74	163,210,162	1
9	224		57	20,000,000		75	141,775,414	2
10	112		58	100,100,100		76	61,500,162	1
11	18		59	33,350,000		77	50,050,050	
12	24		60	26,318,460		78	33,366,700	
13	12		61	21,580,153	3	79	91,312,231	
14	1700		62	183,644,725	1	80	113,060,048	1
15	204		"	122,429,817		81	196,341,461	
16	268		"	91,822,362	3	82	176,858,248	4
17	35		"	73,457,890	1	83	50,100,150	
18	72		63	110,609,056		84	137,909,692	4
19	34		"	73,739,370	2	85	138,065,709	
20	44		"	55,304,528		86	52,042,599	1
21	15		"	44,243,622	2	87	32,377,133	2
22	18,229	1	64	117,555,050		88	31,567,911	
23	48,566		"	78,370,033	1	89	22,137,507	
24	2,260,684	1	"	58,777,525		90	30,541,018	1
25	1,098,152	2	"	47,022,020		91	254,763,048	1
26	6,280,697	1	65	150,150,000		92	11,223,344	5
27	30,044,073		"	100,100,000		93	10,288,065	9
28	3,030,030,017	4	"	75,075,000		94	9,496,676	1
29	43,424,164		"	60,060,000		95	8,818,342	1
30	333,333,333		66	172,839,061	1	96	8,230,452	9
31	111,56[illegible]36		"	115,226,041		97	7,716,049	5
32	14,853,350		"	86,419,530	3	98	7,262,164	1
33	333,333,333	1	"	69,135,624	3	99	6,858,710	9
34	33,116,333		67	105,182,642	1	100	6,497,725	14
35	166,666,666	4	"	70,121,761	2	101	6,172,839	9
36	10,615,098		"	52,591,321	1	102	13,837,649	9
37	111,111,111	1	"	42,073,057		103	526,692	201
38	17,276,877	4	68	456,107,184		104	1,173,048	36
39	60,612,192		"	304,071,456		105	1,373,609	165
40	40,893,040	1	"	228,053,592		106	1,680,136	165
41	332,038	3	"	182,442,873	3	107	560,473	246
42	111,048,531		69	72,844,607		108	1,578,849	173
43	41,027,360	4	"	48,563,071	1	109	1,563,139	185
44	183,947,260	1	"	36,422,303	2	110	1,994,659	131
45	66,666,666	2	"	29,137,842	4	111	2,461,893	45
46	33,333,333	2	70	112,448,107		112	36,529,134	2
47	22,222,222	2	"	74,965,404	2	113	3,652,913	42
48	33,333,333	1	"	56,224,053	2	114	365,291	342

No.	Answers.		No.	Answers.		No.	Ans.	No.	Answers.
	Quot.	R.		Quot.	R.		Quot.		
115	46,549,134	8	124	2,731,158	8	132	31	140	24
116	10,634,524	7	125	546,031	142	133	100	141	5
117	342	4	126	361,155	289	134	20	142	21
118	1,692	48	127	1,758,468	65	135	24	143	3
119	169,724	9	128	6,576,025	102	136	24	144	33
120	23,459	12	129	244,745	223	137	48	145	8
121	200,345	102	130	108,530	2194	138	31	146	95
122	5,463,217	5	131	594,827	383	139	4	147	8
123	10,136,743	16							

GENERAL EXAMPLES.

No.	Answers.	No.	Answers.	No.	Answers.	No.	Answers.
1	168	33	7	61	110	93	47 *r.* 3
2	2,592,000	34	16,674	"	120	94	40
3	484	35	1,012	62	3,999	95	606,304
4	65,536	36	140	63	45,725	96	5,712
5	405	37	$1 05	64	214	97	5,424
6	12	"	17 *r.* 3	65	20	98	119
7	150	38	17	66	37,341	99	6
8	28	39	10	67	78,296	100	21,525
9	38 m. past 9	40	10	68	67,626	101	299
10	896	41	240	69	2,416,878,037	102	59,494
11	9072	42	360	70	303,735,603	103	1,614
12	2	43	600	71	818,800,092	104	10,500
13	8	44	433	72	6,325,084 *r.* 1	105	2,000
14	$20	45	5	73	1,971	106	302
15	$24	46	8	74	592	107	200
16	$8 25	47	6 *r.* 2	75	5,400	108	33
"	$2 75	48	5 *r.* 2	76	5,400	109	4,723
17	70	49	240	77	115,200	110	1,500
18	50	50	224	78	150,700	111	9,704
19	10	51	1	79	3,733	112	46
20	$1 80	52	200	80	11,089	113	18,200
21	$4 40	53	50	81	3,062	114	35
22	85	54	5	82	212	115	40
23	17	55	14	83	2,165	116	12
24	10	56	5 *r.* 11	84	12,558	117	8
25	5	57	60	85	399	118	17
26	2	"	68	86	5,508	119	21
27	80	58	22	87	54	120	24
28	7,290	"	21	88	1,350	121	504
29	9	59	31	89	1 *r.* 106	122	675
30	932	"	33	90	505	"	1,575
31	114	60	25	91	47,488	123	2,025
32	164	"	24	92	56,145	"	4,725

No.	Answers.	No.	Answers.	No.	Answers.	No.	Answers.
124	1,050	146	94	173	900	201	$4 68
"	2,450	147	67	174	40	202	$175 22 r 2
125	900	148	32	175	8	203	$1,400 00
"	1,800	149	8	176	120	204	72
126	2,700	150	$2 29	177	85	"	$4 32
"	5,400	151	$1 10	178	27	205	$28 80
127	1,400	152	71	179	28	206	$172 80
"	2,800	153	$2 72	180	69	207	$8,985 60
128	45	154	$1 79	181	23	208	$2,246 40
129	$11 88	155	$10 12	182	200	"	$6,739 20
130	$70 00	156	$10 12	183	27	209	60
"	$14 00	"	$2 53	184	5,400	210	$6 60
131	$6 80	157	$1 74	185	14 r. 170	211	$26 40
132	$3 40	158	29	186	72	212	$158 40
133	5,475	159	7	187	73 r. 8	213	$203
134	780	160	32	188	$21 50	214	31 r. 2
135	$2 92	161	148	189	$9 96	215	$42 25
"	14 r. 12	162	20	190	75	216	$6 24
136	$6 30	163	$15 00	191	$136 68	217	$62 40
"	21	164	156	192	$260 10	218	$3360
137	$22 87	165	1,092	193	192	219	3
138	820	166	56,784	194	17,856	"	5
139	2 r. 180	167	36	195	22,320	"	3
140	19	"	42	196	162	220	5
141	$1 09	168	24,000	197	19,647	221	$40 10
142	$1 17	169	240	198	363	222	20
143	36	170	1,200	199	30	223	975
144	12	171	20	200	$28 80	224	19 w. 2 d. & 5 sums remain.
145	75	172	7,200				

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